

REPORT ON THE CONSERVATION STATUS OF
Astragalus barrii, A CANDIDATE THREATENED SPECIES

Taxon Name:	<u>Astragalus barrii</u> Barneby
Common Name:	Barr's milk-vetch
Family:	Fabaceae
States Where Taxon Occurs:	U.S.A., Montana, South Dakota and Wyoming
Current Federal Status:	USFWS Notice of Review, Category 2
Recommended Federal Status:	USFWS Notice of Review, Category 3C
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TABLE OF CONTENTS

Page

I. SPECIES INFORMATION

1.	Classification and nomenclature	1
2.	Present legal or other formal status.	2
3.	Description	5
4.	Significance.	6
5.	Geographical distribution	7
6.	General environment and habitat description	11
7.	Population biology of the taxon	16
8.	Population ecology of the taxon	26
9.	Current land ownership and management responsibility.	27
10.	Management practices and experience	28
11.	Evidence of threats to survival	30

II. ASSESSMENT AND RECOMMENDATIONS

12.	General assessment of vigor, trends, and status	30
13.	Recommendations for listing or status change.	31
14.	Recommended critical habitat.	32
15.	Conservation/recovery recommendations	32
16.	Interested parties.	33

III. INFORMATION SOURCES

17.	Sources of information.	34
18.	Summary of materials on file.	36

IV. AUTHORSHIP

19.	Initial authorship.	36
20.	Maintenance of status report.	36

V. NEW INFORMATION

21.	Record of revisions	36
	Literature Cited	37
	Occurrence Records	39
	Maps	67

I. SPECIES INFORMATION

1. Classification and nomenclature.

A. Species.

1. Scientific name.

- a. Binomial:** Astragalus barrii Barneby
- b. Full bibliographic citation:** Barneby, R.C. 1956. Pugillus Astragalorum XIX: Notes on A. sericoleucus Gray and its immediate relatives. Amer. Midl. Nat. 55(2): 504-507.
- c. Type specimen:** United States, Limestone Butte (SE of Oelrichs), Fall River Co., South Dakota, May 4, 1952, Claude A. Barr s.n.. Type specimen deposited at California Academy of Sciences (Barneby 1956).

- 2. Pertinent synonyms:** Orophaca barrii (Barneby) Isely. Published: Isely, D. 1983. New combinations and two new varieties in Astragalus, Orophaca, and Oxytropis (Leguminosae). Systematic Botany 8(4):420-426.
- 3. Common name:** Barr's milk-vetch
- 4. Taxon codes:** PDFAB0F150 (Montana, South Dakota and Wyoming Natural Heritage programs); 5388 ASTBAR, (U.S. Forest Service, Region 1).
- 5. Size of genus:** Astragalus barrii is one of approximately 2,000 species in this large genus. Roughly 550 species occur in North America (Barneby 1964), with 47 species found in Montana (Dorn 1984).

B. Family classification.

- 1. Family name:** Fabaceae.
- 2. Pertinent family synonym:** Leguminosae.
- 3. Common names for the family:** Pea Family.

C. Major plant group: Dicotyledoneae.

- D. **History of knowledge of taxon:** Astragalus barrii was described by R.C. Barneby in 1956. He was given specimens of the plant that were originally labeled as A. tridactylicus Gray, but which he then determined to represent a new species. These specimens were collected by Claude A. Barr at Limestone Butte, Fall River County, South Dakota in May of 1952 (Barneby 1956).

Astragalus barrii was first collected in Montana near Ekalaka (Carter County), by Schunk and Schwantz in 1943 (Barneby 1964). This historic record was not relocated during recent surveys.

Of the 27 currently known records for this species in Montana, 11 records were located during a survey by the Montana Natural Heritage Program under contract to the Custer National Forest in 1988. In 1989, the Montana Natural Heritage Program was contracted by the U.S. Fish and Wildlife Service to conduct a status survey for A. barrii in Montana (Project Agreement No. SE-5-P-2). During surveys of 11-17 May 1989, another six populations were located.

- E. **Comments on current alternative taxonomic treatments:** Orophaca barrii (Barneby) Isely, comb. nov. - Isely (1983) feels that Barneby's (1964) Orophaca phalanx is not associated with any other group of Astragalus. He based this on the characteristics of chromosome number, large hyaline connate stipules, unique leaves and the unilocular and deciduous pods of the group as a whole. In Isely's words, "This combination of characters is found in no other Astragalus." Although his systematic treatment has merit, it has not been widely accepted.

2. **Present legal or other formal status.**

A. **International.**

- a. **Present designated or proposed legal protection or regulation:** None.

B. **National.**

1. **United States.**

- a. **Present designated or proposed legal protection or regulation:** Currently, Astragalus barrii is under notice of

review for potential listing as a threatened species under the U.S. Endangered Species Act of 1973 (U.S. Department of Interior 1985). Specifically, it is included in Category 2 (taxa for which information now in possession of the Service indicates that listing as a threatened or endangered species is possibly appropriate, but for which substantial data on biological vulnerability and threats are not currently known or on file to support the immediate preparation of rules).

The U.S. Forest Service list of sensitive species for Region 1 (Northern Region) currently includes Astragalus barrii (U.S. Department of Agriculture 1988). Objectives and policies of the U.S. Forest Service provide for the management and protection of sensitive species under sections 2670.22 and 2670.32 in the 1984 Forest Service Manual. Under these guidelines the Forest Service is to (a) "maintain viable populations of all native species of plants" (2670.22), (b) "avoid or minimize impacts to species whose viability has been identified as a concern" (2670.32.3) and to (c) "establish objectives for Federal candidate species, in cooperation with the Fish and Wildlife Service...and the states" (2670.32.5).

- b. Other current formal status recommendations:** Astragalus barrii is currently listed as "very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range" (global rank = G3) by The Nature Conservancy.

2. State.

a. Montana.

- i. Present designated or proposed legal protection or regulation:**
None.
- ii. Other current formal status recommendations:** Astragalus barrii is currently listed as

"rare in Montana" (state rank = S3) by the Montana Natural Heritage Program.

iii. Review of past status:

Astragalus barrii was listed as a species of undetermined status by the Montana Rare Plant Project (Lesica *et al.* 1984). At that time, there was not enough information available on the species' distribution and abundance to assess its status in Montana.

b. South Dakota.

i. Present designated or proposed legal protection or regulation: None.

ii. Other current formal status recommendations: Astragalus barrii is currently listed as "rare in South Dakota" (state rank = S3) by the South Dakota Natural Heritage Program (David Ode, South Dakota Natural Heritage Program, pers. comm.).

iii. Review of past status: None known.

c. Wyoming.

i. Present designated or proposed legal protection or regulation: None.

ii. Other current formal status recommendations: The Wyoming Natural Diversity Database has listed Astragalus barrii as "rare in Wyoming" (state rank = S3) (Hollis Marriott, pers. comm.).

iii. Review of past status: None known.

3. Description.

- A. **General nontechnical description:** Astragalus barrii forms dense mats (cushions), which rarely exceed 4 inches in height. Prostrate woody stems give rise to numerous, leaves, each made up of 3 narrowly elliptic leaflets. Both the stems and leaves of A. barrii are densely covered with short, white hairs. Iridescent bluish-purple to pinkish-purple flowers arise on short stalks throughout the mats. In Montana, this species blooms from late April to mid-June, and later forms narrow, egg-shaped, one- to few-seeded pods (adapted from Reel et al. 1989).
- B. **Technical description:** Perennial, low cushion forming plant, up to 1.5 dm. (4.5 dm.) in diameter, with stems reduced to leafy crowns that arise from a closely forking suffrutescent caudex; herbage silvery-strigose with dolabriform hairs up to 1.4 mm. long; stipules 4-8 mm. long, glabrous dorsally; leaves 1-4 cm. long, the 3 leaflets linear-oblongate, oblongate or elliptic-ovate, acute or acutish, 3-12 mm. long; peduncles slender, 7-16 mm. long, and shorter than the leaves; raceme loose, (1) 2-4 flowered, with the fruiting axis up to 5-15 mm. long; calyx (4.6) 5.5-7.1 mm. long, the deeply campanulate or subcylindric tube 3.6-5.1 mm. long, the teeth (1.2) 1.5-2.4 mm. long; petals pink-purple, the obovate-cuneate or broadly oblongate banner (9.6) 10.5-16.7 mm. long; wings 9.1-13.5 mm. long, the claws 4.1-5.5 mm.; anthers (0.45) 0.5-0.7 mm. long; pod narrowly lance-ellipsoid, 4.5-6.5 mm. long, 1.2-1.8 mm. in diameter just above the rounded base and tapering into a slightly incurved lance-subulate beak about as long as the fertile portion, obscurely triquetrous in the lower half, somewhat flattened dorsally, the valves papery, silvery-strigulose; ovules (7) 9-11; seeds (often only one maturing) oblong, scarcely compressed, dull purplish-green, smooth but not lustrous, about 2 mm. long (adapted from Barneby 1956).
- C. **Local field characters:** Astragalus barrii is most easily identified in flower, and is distinguished by its small bluish-purple to bluish-pink flowers, compound leaves with 3 leaflets, and mat forming habit.

Vegetatively, Astragalus barrii is similar to A. gilviflorus, A. hyalinus, A. sericoleucus, and A. aretioides, and they overlap in their geographic distributions. Specimens of A. barrii can only be

certainly distinguished from these species when in flower. However, in the field, A. barrii is distinctive for its small, iridescent, bluish-purple to bluish-pink flowers. Astragalus gilviflorus on the other hand, has large cream to yellowish flowers, sometimes with purple etching, while A. hyalinus has large white flowers with some petals faintly lilac-tinged. Astragalus sericoleucus has pink-purple flowers with a paler horizontal band, but the flowers are about one half the size of flowers of A. barrii. The field characteristics of A. barrii are most similar to A. aretioides; however, the latter has smaller flowers, is more densely mat-forming, and is found at higher elevations in Montana.

- D. **Identifying characteristics of material which is in interstate or international commerce or trade:** No interstate or international commerce or trade is known.
- E. **Photographs and line drawings:** Figure 1, p. 8, is a copy of an illustration that accompanied the description of this species in Reel et al. (1989), drawn by Debbie McNiel. The color slides (p. 9) are duplicates of those taken at the sites indicated by the three-digit occurrence numbers. Additional slides of A. barrii and its habitat are housed at the office of the Montana Natural Heritage Program, Helena, Montana.

4. Significance.

- A. **Natural:** Astragalus barrii is a regional endemic that is known only from southwestern South Dakota, northeastern Wyoming and southeastern Montana. In Montana, it is associated with the barren soils of "gumbo clay" knolls, buttes and cliffs. In many areas it is one of only a few species to stabilize the soil surface.
- B. **Human:** Astragalus barrii was first collected by a rancher, Claude A. Barr, who also ran a small mail-order native plant nursery. He apparently sold this hardy species for horticultural purposes.

Astragalus barrii is also pertinent to the study and delineation of the Orophaca phalanx, and its placement within the genus Astragalus.

5. Geographical distribution.

- A. **Geographical range:** A regional endemic, A. barrii is known from 68 locations in southeastern Montana, southwestern South Dakota, and northeastern Wyoming.

In Montana, A. barrii is currently known from sites in Powder River (19), Bighorn (2), and Rosebud (6) counties. There is also one historical record from Carter County that has never been relocated. Within Region 1 of the U.S. Forest Service, it has been located on the Custer National Forest, Ashland District (Montana). A distribution map of A. barrii populations in Montana is found on p. 10.

In South Dakota, this species is known from sites in Custer (3), Fall River (3), Shannon (9), and Pennington (6) counties; and in Wyoming from Campbell (4), Johnson (7), Natrona (3), Niobrara (1), Sheridan (1), and Weston (3) counties.

B. Precise occurrences.

1. Populations currently known to be extant.

- a. **Montana:** Information on populations is listed in Occurrence Records, pp. 39-66. Exact locations are provided on USGS quadrangle maps, pp. 67-87.

2. Populations known or assumed extirpated.

- a. **Montana:** None known.

3. Historically known populations where current status is not known:

- a. **Montana:** One location of Astragalus barrii is documented by a voucher specimen cited by Barneby (1964). The existing data on this site (Ekalaka (006)) is summarized in Occurrence Records, p. 44. Although information on this record is incomplete, and it was unmappable as a specific point, it is plotted on the USGS Ekalaka quadrangle. The location of this historical site is also marked on Map 1, p 10.

4. Locations not yet investigated believed likely to support additional natural populations:

Much of the appropriate habitat for A. barrii

BARR'S MILKVETCH
Astragalus barrii

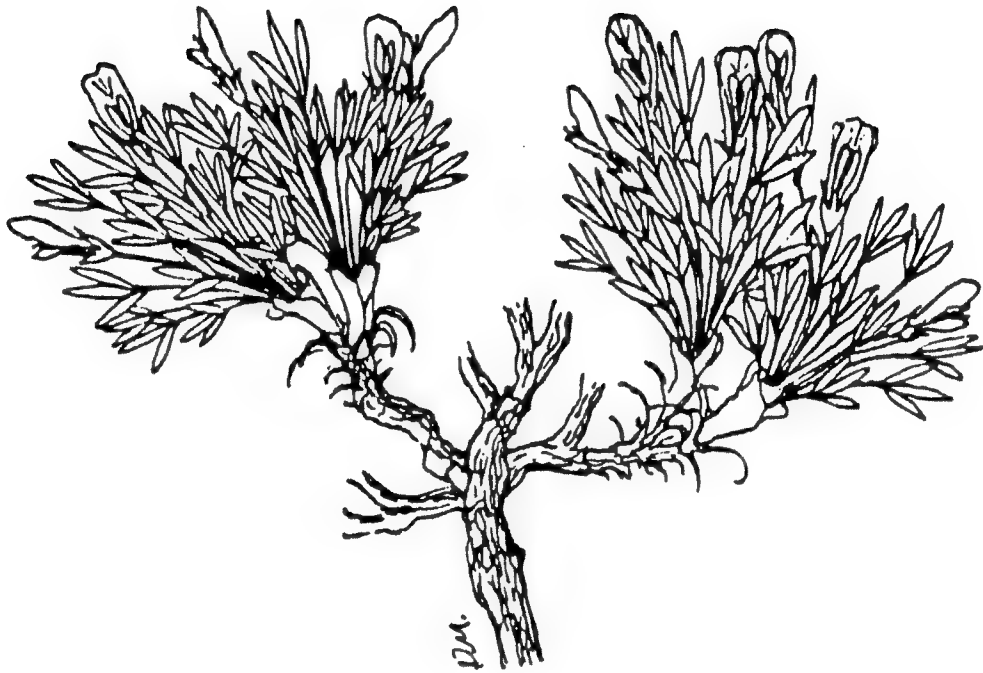


Figure 1. Drawn by Debbie McNiel.

Astragalus barrii
Habitat, (019)
Custer N.F.
May 1988
Lisa Ann Schwarzbarger

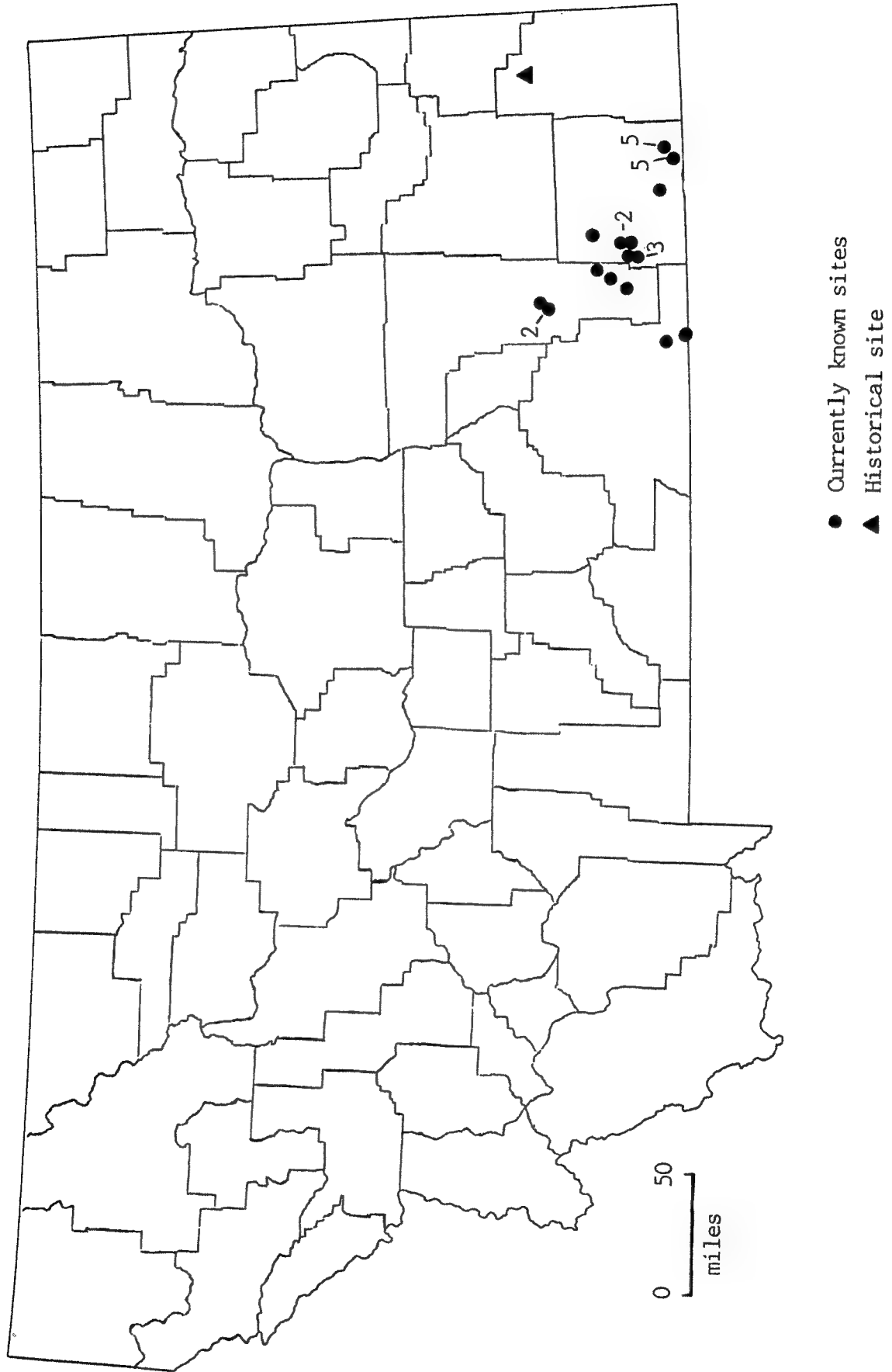
Astragalus barrii
Habitat
Custer N.F.
May 1988
Lisa Ann Schwarzbarger

Astragalus barrii
Habit, Flower
Shore Shelly
(001)
May 1986

Astragalus barrii
Habit, May 1988
Lisa Ann Schwarzbarger

Astragalus barrii
Habit
Custer N.F.
May 1988
Lisa Ann Schwarzbarger

Astragalus barrii
Ranch Creek (024)
Plant loss due to drought.
May 1989
Lisa Ann Schwarzbarger



in Montana has been surveyed. However, from personal observation, there are still unsurveyed areas that almost certainly support populations. These include lands near Biddle, south of the Ranch Creek 1 (024) site, and in areas surrounding the Bell Creek (026) site. Also, lands south of Ashland on the east side of the Tongue River, and southwest of Ashland on the west side of the Tongue River (on the Northern Cheyenne Indian Reservation) may harbor populations.

5. Reports having ambiguous or incomplete locality information:

- a. Montana: See historical record cited in (I.5.B.3.), p. 7.

6. Locations known or suspected to be erroneous reports:

- a. Montana: None known.

C. Biogeographical and phylogenetic history:

Astragalus barrii is one of the few species with a relatively restricted geographic range within the Great Plains. Most of the species in the Great Plains flora have extensive ranges, and many are on the edge of their range within this area (Great Plains Flora Association 1986).

The affinities of A. barrii with other members of the Orophaca phalanx are clear; however, generic delimitation remains disputed (Isely 1983, Barneby 1964).

6. General environment and habitat description.

- A. Concise statement of general environment and habitat: In southeastern Montana, A. barrii is restricted to heavy clay ("gumbo") knobs, buttes, and barren hilltops. The calcareous clay soils in which A. barrii occurs are likely to be low in organic matter, as these locations are sparsely vegetated. A very sparse cover of Pinus ponderosa (ponderosa pine) or Juniperus scopulorum (Rocky Mountain juniper) is found at some locations, but often only a sparse shrub cover of Artemisia tridentata (big sagebrush) and/or Atriplex confertifolia (shadscale) is present.

In southeastern Montana, summers are hot, with brief

convective rain showers; the winters are cold and dry. Principal accumulations of precipitation occur in the form of rain in spring and early summer.

B. Physical characteristics.

1. Climate.

- a. Koppen climate classification:** Type BSw, a steppe climate east of the Continental Divide that is typified by cold dry winters, and convective summer storms (Visher 1954).
 - b. Regional macroclimate:** The summer climate of southeastern Montana is predominantly hot and dry. Spring rains bring the highest amount of precipitation, while summer storms are largely convective and somewhat drier. Winters are cold and dry, with precipitation occurring mostly in the form of snow. Broadus, the nearest long term climatological station (923 m. (3,029 ft.) in elevation), is located 64 km. (40 mi.) to the east of the Custer National Forest sites, and 30 miles north of the Biddle area sites. The mean annual temperature for the time period 1951-1980 at this station was 6.9 °C (44.5 °F). For this same time period, the mean maximum temperature for July was 30.6 °C (87.0 °F), while the mean minimum for January was -15.8 °C (3.6 °F). Mean annual precipitation was 33.9 cm. (13.84 in.) (U.S. Department of Commerce 1982).
 - c. Local microclimate:** Astragalus barrii populations occur on all slope aspects; however, in areas which lack an overstory and receive full light, populations appear to be established more often on northern aspects, and are thus shaded during portions of the day (pers. obs.).
- 2. Air and water quality requirements:** Unknown.
- 3. Physiographic province:** The range of A. barrii lies in the Great Plains Province of the Interior Plains; the western extension of the Central Lowland (semiarid) as outlined by Hunt (1974).

4. **Physiographic and topographic characteristics:** In Montana, populations of A. barrii are most often found on eroding knolls, buttes, and barren hilltops of a particular calcareous, soft shale and siltstone complex. These sites range from level areas to steep slopes (0-35%). Most sites occur on slopes of intermediate steepness (3-8%). All slope aspects are represented; however, many of the sites are on north- or northeast-facing slopes. Populations occur from 3,140 - 4,000 feet in elevation.

Many of the populations are located along rivers or streams, where downcutting has exposed shale and siltstone outcrops.

5. **Edaphic factors:** In Montana, A. barrii sites on the Custer National Forest are on the Midway soil series. These soils are calcareous residuum from calcareous, platy, soft shale parent material, in which the clay is mostly a montmorillonitic mineral type (U.S. Department of Agriculture 1971). The pH (8.0) of these soils is high (Schassberger, pers. measurement 1988, U.S. Department of Agriculture 1971), and the texture is silty to sandy.

In South Dakota, within the White River drainage, A. barrii appears to be restricted to barren outcrops or erosional remnants of one specific geologic unit - the Rockyford Ash Member of the Sharps Formation. The Rockyford Ash Member is comprised of a zeolitic volcanic ash; zeolite minerals are functionally similar to vermiculite and montmorillonite (David Ode, S. Dakota Natural Heritage Program, pers. comm.).

The distribution of A. barrii may partially be determined by soil properties. Soils that have a high content of expandable clay minerals (zeolite, montmorillonite) have a high cation exchange capacity, and hold water longer. However, the high pH of the soils in Montana would limit the availability of iron and manganese (Hausenbueller 1972). One or more of these aspects of the soil may influence the distribution of this species directly. Alternatively, these soil properties might indirectly affect A. barrii by restricting the

establishment of other plant species, which would in turn limit interspecific competition.

6. **Dependence of this taxon on natural disturbance:** This species often occurs on barren eroded microsites, and may depend on the climate that maintains these sites in this condition.
7. **Other unusual physical features:** At some locations, especially on steep slopes, the soils erode during intense rain storms. Because of its cushion habit and dense foliage, soil is maintained beneath A. barrii plants, with the result that the plants frequently remain perched atop small pillars of soil.

C. Biological characteristics.

1. **Vegetation physiognomy and community structure:** In Montana, A. barrii occurs in silty to sandy, calcareous, clay soils. When an upper overstory is present, it usually consists of a sparse cover of Pinus ponderosa (ponderosa pine) and Juniperus scopulorum (Rocky Mountain juniper). Many of the sites only have a shrub overstory, which is dominated by Artemisia tridentata (big sagebrush) and/or Atriplex confertifolia (shadscale). Vegetative cover of grasses and forbs at these sites is low, with few dominant species.
2. **Regional vegetation types:** All but one of the sites in southeastern Montana occur in the Clayey and Shallow Clay Range Site Association according to Ross and Hunter (1976). This association is described as occurring in the 10-14 inch precipitation zone, and list as dominants: western and thickspike wheatgrass, green needlegrass, little bluestem, bluebunch wheatgrass, prairie junegrass, native legumes, big sagebrush, Nuttall saltbush, and winterfat.
3. **Frequently associated species:** In Montana, associated species include:
 - Agropyron spicatum.....(bluebunch wheatgrass)
 - Allium textile.....(textile onion)
 - Andropogon scoparius.....(little bluestem)
 - Artemisia frigida.....(fringed sagewort)
 - Artemisia tridentata.....(big sagebrush)

Astragalus gilviflorus... (threeleaved milk-vetch)
Astragalus spatulatus.... (tufted milk-vetch)
Atriplex confertifolia... (shadscale)
Bouteloua gracilis..... (blue grama)
Calamovilfa longifolia... (prairie sandgrass)
Chrysothamnus nauseosus.. (common rabbit-brush)
Comandra umbellata..... (bastard toad-flax)
Cryptantha celosioides... (northern cryptantha)
Eriogonum pauciflorum.... (few flowered-buckwheat)
Festuca idahoensis..... (Idaho fescue)
Gutierrezia sarothrae.... (broom snakeweed)
Haplopappus acaulis..... (cushion goldenweed)
Haplopappus armerioides.. (thrifty goldenweed)
Hymenopappus filifolius.. (Columbia cut-leaf)
Juniperus scopulorum..... (Rocky Mountain juniper)
Koeleria cristata..... (prairie junegrass)
Linum perenne..... (blue flax)
Musineon divaricatum..... (leafy musineon)
Opuntia polyacantha..... (plains pricklypear)
Oxytropis sericea..... (white locoweed)
Phlox hoodii..... (Hood's phlox)
Phlox alyssifolia..... (alyssum-leaved phlox)
Pinus ponderosa..... (ponderosa pine)
Poa secunda..... (Sandberg's bluegrass)
Yucca glauca..... (soapwell)
Zigadenus venenosus..... (meadow death-camus)

4. **Dominance and frequency of the taxon:** In Montana, most populations are large, and range from ca. 50 to 3,000 plants (mean ca. 1000). The individual plants of a population are often broadly dispersed across the landscape, and therefore canopy coverage of this species is often low. Population distribution appears to be related to available substrate.
5. **Successional phenomena:** Astragalus barrii populations are associated with the harsh edaphic and environmental conditions of badlands areas. These areas receive limited rainfall, and are subject to high light intensities; thus, soil water evaporation is high, and is probably a limiting factor in plant establishment and survival. These types of harsh sites are common habitats for species in the genus Astragalus (Barneby 1964).

The Custer National Forest sites receive a different moisture regime than surrounding areas, and support more successional advanced habitats. It was noted that A. barrii mats in these habitats tended to be larger, and were often only vegetative. Advanced successional habitats may influence the age class distribution of this species; these populations may contain larger older mats that have lower rates of flowering and fruiting, which may result in reduced seedling establishment.

6. **Dependence on dynamic aspects of biotic associations and ecosystem features:** Unknown.
 7. **Other endangered, threatened, rare, or vulnerable species occurring in the habitat of this taxon:** None currently known.
7. **Population biology of the taxon.**
- A. **General summary:** The 27 currently known populations of A. barrii in Montana occur in badlands habitats, in the southeastern portion of the state. Some populations in Montana are separated by up to approximately 70 air miles. The largest population occurs in Powder River County. Advancing vegetational succession may be a factor in the age class distribution of this species.
 - B. **Demography.**
 1. **Known populations:** There are currently 27 known populations of A. barrii in Montana. These populations are located in 3 counties: Bighorn (2), Rosebud (6) and Powder River (19). This species is also known from southwestern South Dakota, and northeastern Wyoming.
 2. **General demographic details (Montana):**
 - a. **Biddle (001)**
 1. **Area occupied by population:** Ca. 15 acres.
 2. **Estimated number of individuals:** Ca. 200-250 plants (1986).
 3. **Density:** Unknown.
 4. **Presence of dispersed seeds:** Unknown.
 5. **Evidence of reproduction:** Flowering plants observed (1986).
 6. **Evidence of population expansion or decline:** Unknown.

- b. **Butte Creek (002)**
 - 1. **Area occupied by population:** Ca. 2 acres.
 - 2. **Estimated number of individuals:** Ca. 70-80 plants in 2 subpopulations (1986).
 - 3. **Density:** Unknown.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Small percentage of flowering and fruiting plants observed (1986).
 - 6. **Evidence of population expansion or decline:** Unknown.
- c. **Decker (003)**
 - 1. **Area occupied by population:** Unknown.
 - 2. **Estimated number of individuals:** Unknown.
 - 3. **Density:** Common in localized area.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed (1983).
 - 6. **Evidence of population expansion or decline:** Unknown.
- d. **Colstrip (004)**
 - 1. **Area occupied by population:** Unknown.
 - 2. **Estimated number of individuals:** Unknown.
 - 3. **Density:** Unknown.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed (1975).
 - 6. **Evidence of population expansion or decline:** Unknown.
- e. **Miller Coulee (005)**
 - 1. **Area occupied by population:** Unknown.
 - 2. **Estimated number of individuals:** Unknown.
 - 3. **Density:** Unknown.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed (1985).

6. Evidence of population expansion or decline: Unknown.
-
- f. Biddle School Section (007)
 1. Area occupied by population: Ca. 128 acres.
 2. Estimated number of individuals: Ca. 600-700 plants in 10 subpopulations (1986).
 3. Density: Unknown.
 4. Presence of dispersed seeds: Unknown.
 5. Evidence of reproduction: Flowers and early fruits observed (1986).
 6. Evidence of population expansion or decline: Unknown.
 - g. Bobcat Creek (008)
 1. Area occupied by population: Ca. 34 acres.
 2. Estimated number of individuals: Ca. 80-100 plants in 2 subpopulations (1986).
 3. Density: Scattered.
 4. Presence of dispersed seeds: Unknown.
 5. Evidence of reproduction: Flowering plants observed (1986).
 6. Evidence of population expansion or decline: Unknown.
 - h. Wild Bill Creek (009)
 1. Area occupied by population: Ca. 5 acres.
 2. Estimated number of individuals: Ca. 200-225 plants (1986).
 3. Density: Unknown.
 4. Presence of dispersed seeds: Unknown.
 5. Evidence of reproduction: Flowering plants observed (1986).
 6. Evidence of population expansion or decline: Unknown.
 - i. Stag Rock Knolls (010)
 1. Area occupied by population: Ca. 15 acres.
 2. Estimated number of individuals: Ca. 1,250 plants in 4 subpopulations (1988).
 3. Density: Locally common.

4. **Presence of dispersed seeds:**
Unknown.
 5. **Evidence of reproduction:** Flowering plants observed (1988).
 6. **Evidence of population expansion or decline:** Unknown.
- j. **Fort Howes Ridge (011)**
1. **Area occupied by population:** Ca. 4 acres.
 2. **Estimated number of individuals:** Ca. 600 plants in 2 subpopulations (1988).
 3. **Density:** Scattered along cliffs.
 4. **Presence of dispersed seeds:**
Unknown.
 5. **Evidence of reproduction:** Flowering plants observed (1988).
 6. **Evidence of population expansion or decline:** Unknown.
- k. **Taylor Butte (012)**
1. **Area occupied by population:** Ca. 35 acres.
 2. **Estimated number of individuals:** Ca. 2,000 individuals (1988).
 3. **Density:** Locally common.
 4. **Presence of dispersed seeds:**
Unknown.
 5. **Evidence of reproduction:** Flowering plants observed (1988).
 6. **Evidence of population expansion or decline:** Population appears stable.
- l. **Stag Rock Cliff Tops (013)**
1. **Area occupied by population:** Ca. 45 acres.
 2. **Estimated number of individuals:** Ca. 1,750 plants in 3 subpopulations (1988).
 3. **Density:** Scattered.
 4. **Presence of dispersed seeds:**
Unknown.
 5. **Evidence of reproduction:** Flowering plants observed (1988).
 6. **Evidence of population expansion or decline:** Larger plant mats in areas shaded by trees had no flowers, and may be only vegetative. It is possible that these plants may be reaching the end of their life cycle.

- m. **Lyon Creek Ridge (014)**
 - 1. **Area occupied by population:** Ca. 40 acres.
 - 2. **Estimated number of individuals:** Ca. 2,400 individuals in 4 subpopulations (1988).
 - 3. **Density:** Common in localized areas.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Sparsely flowering (1988).
 - 6. **Evidence of population expansion or decline:** Large population with few flowering individuals (1988). It is possible that these plants may be reaching the end of their life cycle.

- n. **King Creek Well (015)**
 - 1. **Area occupied by population:** Ca. 2 acres.
 - 2. **Estimated number of individuals:** Ca. 2,000 plants (1988).
 - 3. **Density:** Common in localized area.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering observed in 1988.
 - 6. **Evidence of population expansion or decline:** Unknown.

- o. **Stag Rock Reservoir Ridges (016)**
 - 1. **Area occupied by population:** Ca. 35 acres.
 - 2. **Estimated number of individuals:** Ca. 950 plants, in 3 subpopulations (1988).
 - 3. **Density:** Scattered.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed (1988).
 - 6. **Evidence of population expansion or decline:** Unknown.

- p. **NW Buttress Taylor Butte (017)**
 - 1. **Area occupied by population:** Ca. 20 acres.
 - 2. **Estimated number of individuals:** Ca. 3,050 plants (1988).
 - 3. **Density:** Scattered along cliffs.
 - 4. **Presence of dispersed seeds:** Unknown.

5. **Evidence of reproduction:** Flowering plants observed (1988).
 6. **Evidence of population expansion or decline:** Larger mats not flowering. It is possible that these plants may be reaching the end of their life cycle.
- q. **Gate Creek (018)**
1. **Area occupied by population:** Ca. 1 acre.
 2. **Estimated number of individuals:** Ca. 200-250 plants (1988).
 3. **Density:** Locally common.
 4. **Presence of dispersed seeds:** Unknown.
 5. **Evidence of reproduction:** Flowering plants observed (1988).
 6. **Evidence of population expansion or decline:** Unknown.
- r. **O'Dell Creek Buttress (019)**
1. **Area occupied by population:** Ca. 1 acre.
 2. **Estimated number of individuals:** Ca. 200 plants (1988).
 3. **Density:** Scattered.
 4. **Presence of dispersed seeds:** Unknown.
 5. **Evidence of reproduction:** Flowering plants observed.
 6. **Evidence of population expansion or decline:** Unknown.
- s. **Sheep Well Road (020)**
1. **Area occupied by population:** Ca. 1 acre.
 2. **Estimated number of individuals:** Ca. 200-250 plants (1988).
 3. **Density:** Scattered.
 4. **Presence of dispersed seeds:** Unknown.
 5. **Evidence of reproduction:** Flowering plants observed.
 6. **Evidence of population expansion or decline:** Unknown.
- t. **Scoles Ranch Road (021)**
1. **Area occupied by population:** Ca. 5 acres.
 2. **Estimated number of individuals:** Unknown.

- 3. **Density:** Locally common.
 - 4. **Presence of dispersed seeds:**
Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Population decline (1989), due to losses from recent drought years.
- u. **South Fork Wright Creek 1 (022)**
- 1. **Area occupied by population:** Ca. 2 acres.
 - 2. **Estimated number of individuals:**
Unknown.
 - 3. **Density:** Locally common.
 - 4. **Presence of dispersed seeds:**
Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Population decline (1989), due to losses from recent drought years.
- v. **South Fork Wright Creek 2 (023)**
- 1. **Area occupied by population:** Ca. 2 acres.
 - 2. **Estimated number of individuals:** Ca. 20 plants.
 - 3. **Density:** Sparse.
 - 4. **Presence of dispersed seeds:**
Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Population decline (1989), due to losses from recent drought years.
- w. **Ranch Creek 1 (024)**
- 1. **Area occupied by population:** Ca. 40 acres.
 - 2. **Estimated number of individuals:** Ca. 1,000-1,500 individuals.
 - 3. **Density:** Locally common.
 - 4. **Presence of dispersed seeds:**
Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Population decline (1989),

due to losses from recent drought years.

- x. **South Biddle (025)**
 - 1. **Area occupied by population:** Ca. 5 acres.
 - 2. **Estimated number of individuals:** Two small subpopulations.
 - 3. **Density:** Locally common.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Population decline (1989), due to losses from recent drought years.
- y. **Bell Creek (026)**
 - 1. **Area occupied by population:** Ca. 5 acres.
 - 2. **Estimated number of individuals:** Unknown, area incompletely surveyed.
 - 3. **Density:** Unknown.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Unknown.
- z. **Colstrip Southeast (027)**
 - 1. **Area occupied by population:** Unknown.
 - 2. **Estimated number of individuals:** Unknown.
 - 3. **Density:** Unknown.
 - 4. **Presence of dispersed seeds:** Unknown.
 - 5. **Evidence of reproduction:** Flowering plants observed.
 - 6. **Evidence of population expansion or decline:** Unknown.
- aa. **Spring Creek (028)**
 - 1. **Area occupied by population:** Ca. 1 acre.
 - 2. **Estimated number of individuals:** Ca. 12 plants.
 - 3. **Density:** Unknown.
 - 4. **Presence of dispersed seeds:** Unknown.

5. **Evidence of reproduction:** Flowering and fruiting observed (1989).
6. **Evidence of population expansion or decline:** Unknown.

C. Phenology.

1. **Patterns:** An early-blooming species, A. barrii flowers from early May through mid-June, depending on climatic conditions, latitude, and aspect. At many sites, extensive vegetative mats were observed without flowers. It is not known if this condition is due to senescence of the individuals through natural aging, advanced succession within the habitat (i.e., increased overstory cover), an obscure life history pattern, or other unknown factors.
2. **Relation to climate and microclimate:** Many of the known sites for A. barrii, especially the populations where there is no overstory present, occur on steep slopes with northeast or northwest aspects. These sites are shaded for at least some parts of the day. Drought conditions existed throughout most of southeastern Montana in 1987 and 1988. During surveys in 1989, numerous plants were observed to be partially or completely dead (See color slide, p. 9). Especially heavy losses were incurred at sites located atop the highest, most barren knolls and ridgelines. A long-term climate change towards a warmer, drier environment, would likely have a negative effect on populations of A. barrii.

D. Reproductive ecology.

1. **Types of reproduction:** Little is known of the reproductive biology of A. barrii except that it reproduces by seed. However, A. barrii produces few or no flowers in some years (Locklear 1986), and few seedling were observed during survey work (Schassberger, pers. obs., Shelly pers. comm.).

Within the group *Orophaca*, a minimum age of 25 years was established for individual plants of A. aretioides, and even small individuals of A. tridactylicus averaged over 15 years of age (Roberts 1977). Astragalus barrii also produces large woody mats, and may be long lived. If this is the case, observed low

recruitment may not be detrimental to the persistence of populations. Population size may be buffered by the long-lived nature of the plants.

2. Pollination.

- a. **Mechanisms:** Astragalus barrii is probably dependent on insects for pollination.
- b. **Specific known pollinators:** None known.
- c. **Other suspected pollinators:** None known.
- d. **Vulnerability of pollinators:** Not known.

3. Seed dispersal.

- a. **General mechanisms:** The pods of A. barrii are deciduous, and may roll or blow about, aiding in seed dispersal (Roberts 1977). Pods dehisce from the base upwards along both the dorsal and ventral sutures allowing for seed release.
- b. **Specific agents:** Not known.
- c. **Vulnerability of dispersal agents and mechanisms:** Not known.
- d. **Patterns of propagule dispersal:** Populations and subpopulations generally have a clumped distribution, which may be due to localized seed dispersal, although other factors such as substrate availability may play a major role.

4. Seed biology.

- a. **Amount and variation of seed production:** Apparently only one seed reaches maturity within each pod of A. barrii (Barneby 1964).
- b. **Seed viability and longevity:** Unknown.
- c. **Dormancy requirements:** Unknown.
- d. **Germination requirements:** Scarification appears to enhance germination of A. barrii seeds (Locklear 1987).
- e. **Percent germination:** Unknown.

5. **Seedling ecology:** Unknown. However, very small seedlings were rarely observed during field surveys for A. barrii, or during research on this group of Astragalus species (Roberts 1977).
6. **Survival and mortality:** Barneby (1964) asserts that "(t)he ability to survive and subsequently to require a difficult environment has enabled members of the genus to colonize a great variety of raw, newly exposed, often unpromising habitats"; A. barrii is no exception. Although A. barrii may not flower yearly, vegetative spreading allows this perennial species to augment its growth yearly.

Individual plants of several other species in the Orophaca group have been examined (Roberts 1977), and were found to have minimum ages of 15 and 25 years. From the sizes of the mats observed in many locations in southeastern Montana, it is likely that this A. barrii is also long-lived.

A high mortality rate was observed for some populations in more exposed locations in 1989. The dry years of 1987 and 1988 probably prompted these losses. See color slides p. 9.

7. **Overall assessment of taxon's reproductive success:** Most populations in Montana are large, and seem to be well established.
8. **Population ecology of the taxon.**
 - A. **General summary:** Species in the genus Astragalus rarely tolerate direct competition or shade cast by other plants (Barneby 1964). It was observed that populations of A. barrii were most often found on barren ground. Total vegetation cover (by ocular estimation) rarely exceeded 50%, and was often lower.
 - B. **Positive and neutral interactions:** None observed.
 - C. **Negative interactions.**
 1. **Herbivores, predators, pests, parasites and diseases:** No predation on A. barrii populations was observed, and it appears that livestock do not prefer this species from observations of on grazed allotments.

2. Competition.

- a. **Intraspecific:** Individual plants of A. barrii appear to be widely dispersed within populations, and there is no evidence of competition at the adult life stage. It is possible that competition induces this spacing during seedling establishment.
- b. **Interspecific:** Although undocumented, it is likely that A. barrii does not compete well in dense vegetation, and is limited to sites with low total vegetative cover.

3. Toxic and allelopathic interactions: Not known.

D. Hybridization.

- 1. **Naturally occurring:** Unknown.
- 2. **Artificially induced:** Unknown.
- 3. **Potential for spontaneous occurrence in cultivation:** Unknown.

E. Other factors of population ecology: Unknown.

9. Current land ownership and management responsibility.

A. General nature of ownership: United States Government, State of Montana, private.

B. Specific landowners (Montana):

- 1. U.S. Forest Service
Custer National Forest
2602 First Avenue North
Billings, MT 59103
- 2. Bureau of Land Management
Miles City District Office
Garryowen Road
P.O. Box 940
Miles City, MT 59301
- 3. State of Montana
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59620

4. Privately owned (partial or full) sites:

Biddle (001)
 Decker (003)
 Colstrip (004)
 Miller Coulee (005)
 Bobcat Creek (008), partial
 Gate Creek (018), partial
 O'Dell Creek Buttress (019)
 Scoles Ranch Road (021)
 South Fork Wright Creek 1 (022)
 Ranch Creek 1 (024), partial
 South Biddle (025)
 Colstrip Southeast (027)
 Spring Creek (028)

C. Management responsibility: Same as ownership given above.

D. Easements, conservation restrictions, etc.:
Astragalus barrii is on the U.S. Forest Service Region 1 (Northern Region) Sensitive Plant List. Plants on this list are protected on U.S.F.S. lands as discussed in I.2.B.1.a. (p. 2).

10. Management practices and experience.

A. Habitat management.

1. Review of past management and land use experiences.

a. This taxon: There are currently no management plans in effect for this species.

b. Related taxa: Unknown.

c. Other ecologically similar taxa: Unknown.

2. Performance under changed conditions: Drought conditions in southeast Montana have caused loss of individual plants. It is likely that a change toward a warmer dryer climate would have a negative affect on this species.

3. Current management policies and actions: A report on A. barrii for the Custer National Forest was prepared by the Montana Natural Heritage Program in 1988 (Schassberger 1988). This report contained locational data for all populations on the Custer National Forest;

copies were made available to the Forest and to the U.S.F.S. Regional office. Policies and provisions by the U.S.F.S. for sensitive plant species are outlined in section I.2.B.1.a. (p. 2) of this report.

4. **Future land use:** Several occurrences of this species are on or adjacent to land that is being strip mined for coal. It is possible that some of these occurrences may be eliminated through continued mining. Populations on private mine lands should be periodically resurveyed.

B. Cultivation.

1. **Controlled propagation techniques:** Small mats of A. barrii have been successfully transplanted into a mixture of one-third sand, one-third clay loam, and one-third gravel including limestone, and planted well-spaced, in full sun (Barr 1951). Also, seeds of A. barrii were successfully germinated, and plants are being propagated by the Nebraska Statewide Arboretum under the auspices of the Center for Plant Conservation (Locklear 1987).
2. **Ease of transplanting:** Young (small) mats of A. barrii appear to be more successful in transplants than older (larger) mats (Barr 1951).
3. **Pertinent horticultural knowledge:** Several of the cushion Astragalus appear to transplant well, but require sites with full light and no competition from other plants (Barr 1951). More information on this species may be available from the Nebraska Statewide Arboretum (Locklear 1987).
4. **Status and location of presently cultivated material:**
 - a. **Specimen plants:** Plants of A. barrii were transplanted by Claude A. Barr to the Prairie Gem Ranch near Smithwick, South Dakota in the late 1940's or early 1950's (Barneby 1956). He also apparently sold this species for horticultural purposes. However, it is not known if these horticultural specimens are extant.

Seeds of A. barrii were collected by the Nebraska Statewide Arboretum in 1986. These seeds were then germinated to establish and maintain living specimens of this species for research and educational purposes (Locklear 1987).

- b. **Self-sustaining breeding populations:**
None known.
- c. **Stored seed:** The Nebraska Statewide Arboretum is maintaining seeds of A. barrii under the auspices of the Center for Plant Conservation (Locklear 1987).

11. Evidence of threats to survival.

- A. **Present or threatened destruction, modification, or curtailment of habitat or range:** As stated above (10.A.4., p. 29), several of the sites may be threatened by the strip mining of coal on private lands, including Miller Coulee (005), Colstrip SE (027), and Pearl School (028). Some populations have probably been extirpated as a result of this activity.
- B. **Overutilization for commercial, sporting, scientific, or educational purposes:** No known threats.
- C. **Disease, predation, or grazing:** No known threats.
- D. **Inadequacy of existing regulatory mechanisms:** Currently, there are no statutes in Montana which provide state legal protection for A. barrii.
- E. **Other natural or man-made factors:** Drought-induced loss of individuals indicates that a long-term change towards a warmer and dryer climate might threaten the existence of the lower-elevation populations of A. barrii, especially those in more exposed locations.

II. ASSESSMENT AND RECOMMENDATIONS

- 12. **General assessment of vigor, trends, and status:** In Montana, Astragalus barrii is currently known from 27 locations in Bighorn, Powder River and Rosebud counties, and from one historic location in Carter County. Many of the populations are large.

Some of the populations on the Custer National Forest occur on sites where plant succession is more advanced

(i.e., a higher percent cover of overstory vegetation and ground litter is present). Astragalus barrii plants at these sites are generally large, vegetatively spreading mats that do not appear to produce flowers on a yearly basis. Almost all of the populations on the Custer National Forest appear less affected by drought conditions, probably due to shading by the overstory and slightly higher amounts of precipitation.

Drought conditions in 1987 and 1988 resulted in large losses in A. barrii populations, especially at lower elevations, in lower precipitation zones, and on more exposed sites. This may be a common cyclical trend. It does however indicate that A. barrii populations would respond negatively to a long-term climate shift toward a warmer, dryer environment.

13. Recommendations for listing or status change.

- A. Recommendation to U.S. Fish and Wildlife Service:**
On the basis of information obtained during recent field surveys, and knowledge of the taxon, it is recommended that Astragalus barrii be placed in category 3C, as a species that has proven more abundant than was previously thought. However, A. barrii is a regional endemic; thus, should further research or changes in land use indicate significant decline in this taxon, it should be reevaluated for possible inclusion in category 1 or 2.
- B. Recommendations to other U.S. federal agencies:**
Astragalus barrii should remain on the U.S. Forest Service Region 1 list of sensitive species. The limited distribution of the species in Region 1, and the potential loss of populations on private lands, warrant this status. Also, populations in habitats on the Custer National Forest appear to be buffered more from seasonal changes in precipitation and temperatures.
- C. Other status recommendations.**
 - 1. Counties and local areas:** No recommendations.
 - 2. States:** Astragalus barrii is currently listed as "rare in Montana" (state rank = S3) by the Montana Natural Heritage Program.
 - 3. Other nations:** Not applicable.
 - 4. International:** Not applicable.

14. **Recommended critical habitat:** A better understanding of the association of this species with particular types of soils is necessary before critical habitat can be recommended.

15. **Conservation/recovery recommendations.**

A. General conservation recommendations.

1. **Recommendations regarding present or anticipated activities:** Several of the occurrences of this species are on or near land that is being stripmined for coal. It is possible that some of these occurrences may be eliminated through continued mining. Should large numbers of these populations be lost as a result, the status of the species should be reevaluated.

2. **Areas recommended for protection:** The Biddle School Section (007) was recommended as a proposed Rare Plant Natural Area by the Montana Natural Areas Committee (Loop and Bird 1986). This site is on state land. To date, the state has no funding for a Natural Areas Program and has not initiated the establishment of this site as a natural area.

Several sites (Taylor Butte Rim (012), King Creek Well (015)) on the Custer National Forest support large populations of A. barrii, which appear to be somewhat buffered against drought conditions, probably as a result of higher precipitation. These sites would be particularly appropriate for conservation measures.

3. **Habitat management recommendations:** No recommendations.

4. **Publicity sensitivity:** None.

5. **Other recommendations:** None.

→ **Monitoring activities and research needs:** Although much appropriate habitat for A. barrii in Montana has been surveyed, there are still unsurveyed areas that almost certainly support populations (Lisa Schassberger, pers. obs.). These potential areas include, lands near Biddle, south of the Ranch Creek 1 (024) site, and in areas surrounding the Bell Creek (026) site; also, lands south of Ashland on the east side of the Tongue River. It is recommended that the Northern Cheyenne Indian reservation survey its lands for this species,

especially the eastern and southeastern boundaries near the Tongue River.

16. Interested parties:

Office of Endangered Species
ATTN: Dr. James Miller
U.S. Fish and Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, CO 80225

U.S. Fish and Wildlife Service
ATTN: Carol Taylor
Fish and Wildlife Enhancement
Federal Building, 301 S. Park
P.O. Box 10023
Helena, MT 59626

Office of Endangered Species
ATTN: Dr. John Fay
U.S. Fish and Wildlife Service
Washington, D.C. 20240

U.S. Forest Service, Region One
ATTN: Angela Evenden
Federal Building
P.O. Box 7669
Missoula, MT 59807

The Nature Conservancy
ATTN: Dr. Larry Morse
1815 North Lynn Street
Arlington, VA 22209

The Nature Conservancy
ATTN: Dr. Joan Bird and Bernie Hall
Montana Big Sky Field Office
P.O. Box 258
Helena, MT 59624

Montana Natural Heritage Program
State Library Building
1515 E. 6th Ave.
Helena, MT 59620

South Dakota Natural Heritage Program
ATTN: Dave Ode
South Dakota Dept. of Game, Fish & Parks
Wildlife Division
445 E. Capitol Ave.
Pierre, SD 57501

Wyoming Natural Diversity Database
ATTN: Hollis Marriott
3165 University Station
Laramie, WY 82071

III. INFORMATION SOURCES

17. Sources of Information.

A. Publications.

1. References cited in report: See Literature Cited (p. 37).

- B. Museum collections: Specimens are deposited at MONTU (University of Montana Herbarium), RM (Rocky Mountain Herbarium, University of Wyoming), UTC (Intermountain Herbarium, Utah State University) and MONT (Montana State University Herbarium). The following list of known herbarium specimens from Montana is organized by occurrence number:

- 001- Shelly, J.S. (1058) (MONTU)
Barneby, R.C. (13233) (RM)
- 002- Shelly, J.S. (1064) (MONTU)
- 003- Lesica, P. (2604) (MONTU)
- 004- Lackschewitz, K.H. (5950) (MONTU)
- 006- Schunk & Schwantz (S.N.) (UTC)
- 007- Shelly, J.S. (1059) (MONTU)
- 009- Shelly, J.S. (1062) (MONTU)
- 010- Schassberger, L.A. (176), (177), (180)
(MONTU)
- 011- Schassberger, L.A. (178) (MONTU)
- 012- Schassberger, L.A. (179) (MONTU)
- 013- Schassberger, L.A. (181), (190), (191)
(MONTU)
- 014- Schassberger, L.A. (184), (192), (193)
(MONTU)

- 015- Schassberger, L.A. (185) (MONTU)
- 016- Schassberger, L.A. (187), (188), (189)
(MONTU)
- 017- Schassberger, L.A. (194), (195) (MONTU)
- 018- Schassberger, L.A. (196) (MONTU)
- 019- Schassberger, L.A. (197) (MONTU)
- 020- Schassberger, L.A. (198) (MONTU)
- 021- Schassberger, L.A. (255) (MONT)
- 024- Schassberger, L.A. (256) (MONTU)
- 025- Schassberger, L.A. (258) (MONTU)
- 028- Hallsten, G.P. (2617) personal collection

C. Fieldwork.

1. Surveys conducted:

J. Stephen Shelly : 18-22 May 1986

Lisa A. Schassberger: 12-21 May 1988
11-17 May 1989

D. Knowledgeable individuals:

Lisa Ann Schassberger
Montana Natural Heritage Program
State Library Building
1515 E. 6th Ave.
Helena, MT 59620

J. Stephen Shelly
Montana Natural Heritage Program
State Library Building
1515 E. 6th Ave.
Helena, MT 59620

Peter Lesica
Division of Biological Sciences
University of Montana
Missoula, MT 59812

E. Other information sources: Color slides, maps and

field forms are on file at the office of the Montana Natural Heritage Program (see section II.16 (p.33) for addresses).

18. **Summary of materials on file:** All detailed field forms, maps and color slides are on file at the office of the Montana Natural Heritage Program. Herbarium vouchers for Montana populations are deposited as described in section III.17.B. (p. 34).

IV. AUTHORSHIP

19. **Initial authorship:**

Lisa Ann Schassberger
Montana Natural Heritage Program
State Library Building
1515 E. 6th Ave.
Helena, MT 59620
Phone: (406) 444-3009

20. **Maintenance of status report:** The Montana Natural Heritage Program will maintain current information and update the status report as needed.

V. NEW INFORMATION

21. **Record of revisions:** Not currently applicable.

Literature Cited

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- Shelly, J.S. 1989. Plant species of special concern. Montana Natural Heritage Program, Helena. 22 pp., mimeo.
- U.S. Department of Agriculture. 1971. Soil Report for Ashland and Fort Howes Ranger Districts, Custer National Forest. Region 1, U.S. Forest Service, Missoula, Montana. Unpublished. 171 pp.
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- U.S. Department of Commerce. 1982. Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1951-80. National Oceanic and Atmospheric Administration, Climatology of the United States No. 81. 23 pp.
- U.S. Department of Interior, Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants: Review of plant taxa for listing as endangered or threatened species. Federal Register 50 (188):39526-39584.
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ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.001

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: BIDDLE
County: Powder River

USGS quadrangle: BIDDLE

Township-range: 008S052E Section: 22 Center
Township-range comments: Sec 22 E2E2

Survey date:	1986-05-20	Elevation:	3440
First observation:	1961	Slope/aspect:	
Last observation:	1986-05-20	Size (acres):	15

Location:

ALONG BLUFF ON E. SIDE OF ST. HWY. 59, 1.7 MILES N. OF
BIDDLE, MT, OVERLOOKING THE LITTLE POWDER RIVER. ALSO JUST WEST
OF HIGHWAY (LESICA, 1986).

Element occurrence data:

"FORMING DOMED CUSHIONS UP TO 5 DM IN DIAMETER" (BARNEBY
13233); 1986: CA. 200-250 PLANTS, MOST IN FLOWER; EVIDENCE
OF LIGHT GRAZING BY HORSES.

General site description:

ON LOW SANDSTONE BLUFF; ARTEMISIA TRIDENTATA/GRASSLAND, WITH
OPUNTIA POLYACANTHA, ARTEMISIA FRIGIDA, BOUTELOUA GRACILIS,
KOELERIA MACRANTHA, CRYPTANTHA CELOSIODES, PHLOX SP., AND POA
SP.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

SHELLY, J.S. 1986. FIELD SURVEY TO SOUTHEASTERN MONTANA OF
18-22 MAY 1986.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.002

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: BUTTE CREEK
County: Powder River

USGS quadrangle: BALDY PEAK

Township-range: 007S050E Section: 04
Township-range comments: S2SE4

Survey date:	1986-05-21	Elevation:	3350
First observation:		Slope/aspect:	
Last observation:	1986-05-21	Size (acres):	2

Location:

POWDER RIVER BADLANDS, 0.2-0.45 AIR MILES E. OF THE BUTTE CREEK RD., 0.8 MI. S. OF ITS JUNCTION WITH THE POWDER RIVER RD., E. OF BUTTE CREEK.

Element occurrence data:

CA. 70-80 PLANTS, 2 SUBPOPULATIONS; 50% IN FLOWER AND EARLY FRUIT; SOME SIGNS OF LIGHT GRAZING; THIS MAY BE A RELOCATION OF A HISTORICAL COLLECTION, "BUTTE CREEK," CITED BY R. BARNEBY (1956).

General site description:

ERODING SILT-CLAY SOIL, IN BARREN, LEVEL TO SLOPING AREAS; WITH ARTEMISIA TRIDENTATA/AGROPYRON SPICATUM, JUNIPERUS SCOPULORUM, ASTRAGALUS SPATULATUS, A. GILVIFLORUS.

Land owner/manager:

BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SHELLY, J.S. 1986. FIELD SURVEY TO SOUTHEASTERN MONTANA OF 18-22 MAY 1986.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.003

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: DECKER
County: Big Horn

USGS quadrangle: PEARL SCHOOL

Township-range: 009S039E Section: 25
Township-range comments: NE4

Survey date: 1983-06-18	Elevation: 3760
First observation: 1983	Slope/aspect:
Last observation: 1983-06-18	Size (acres): 0

Location:

CA. 1 MI. SOUTH OF SQUIRREL CREEK AND 1/2 MI. WEST OF
DECKER-SHERIDAN ROAD, ON THE CX RANCH.

Element occurrence data:
COMMON.

General site description:

BARREN CLAY SOIL ON RIDGETOP, WITH HAPLOPAPPUS ACAULIS AND
ERIOGONUM PAUCIFLORUM.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF
MONTANA, MISSOULA, MT.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.004

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: COLSTRIP
County: Rosebud

USGS quadrangle: COLSTRIP SE

Township-range: 001N041E Section: 11
Township-range comments: NE4

Survey date:	1975-05-20	Elevation:	3580
First observation:	1975	Slope/aspect:	
Last observation:	1975-05-20	Size (acres):	0

Location:

MONTANA STATE DEPT. OF HEALTH MONITORING SITE, 1.5 MI. SE.
OF COLSTRIP.

Element occurrence data:
UNKNOWN.

General site description:

STEEP BUTTE WITH MANY ROADCUTS AND GRAZING MARKS; ON BORDER
OF WATERSHED 10100003.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

LACKSCHEWITZ, K.H. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF
MONTANA, MISSOULA, MT.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.005

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: MILLER COULEE
County: Rosebud

USGS quadrangle: COLSTRIP SE
COLSTRIP SW

Township-range: 001N041E Section: 22
Township-range comments: NW4SW4

Survey date: 1985-05-18	Elevation: 3440
First observation: 1985	Slope/aspect:
Last observation: 1985-05-18	Size (acres): 0

Location:

CA. 0.2 AIR MILES NORTH OF MILLER COULEE, CA. 4.5 AIR MILES
SOUTH OF COLSTRIP.

Element occurrence data:

"JUST OVER FENCE FROM 'AREA A' RECLAMATION" (BIG SKY STRIP
MINE)."

General site description:

ON BARREN, DECOMPOSING SANDSTONE CAP; IN SPARSE VEGETATION
SURROUNDED BY PINUS PONDEROSA, WITH HYMENOPAPPUS FILIFOLIUS.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

SCOW, KEN. WESTECH, INC., 3005 AIRPORT RD., HELENA, MT
59601.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.006

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: EKALAKA
County: Carter

USGS quadrangle: EKALAKA

Township-range: 002N058E Section: 29
Township-range comments: 28,33

Survey date: 1943-	Elevation: 3700
First observation: 1943	Slope/aspect:
Last observation: 1943-	Size (acres): 0

Location:

"FROM EKALAKA, MONTANA" (BARNEBY, 1964).

Element occurrence data:

UNKNOWN; TOPO MAP SHOWS NUMEROUS "BUTTES" IN THE VICINITY OF
EKALAKA.

General site description:

"GULLIED KNOLLS, BUTTES AND BARREN HILLTOPS,...ON LIMESTONE
OR SANDSTONE" (BARNEBY, 1964).

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

BARNEBY, R. 1964. ATLAS OF NORTH AMERICAN ASTRAGALUS. MEM.
NY BOTANICAL GARDEN, VOL. 13, PART 2.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.007

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: BIDDLE SCHOOL SECTION
County: Powder River

USGS quadrangle: BIDDLE

Township-range: 008S052E Section: 36
Township-range comments: N2, SW4

Survey date: 1986-05-20	Elevation: 3600
First observation: 1986	Slope/aspect:
Last observation: 1986-05-20	Size (acres): 128

Location:

CA. 2 AIR MILES ESE OF BIDDLE, MT, 0.3-0.9 AIR MILES NE OF THE
BIDDLE-RIDGE ROAD, 2.25 MILES SE OF ITS JUNCTION WITH STATE
HWY 59, NORTH OF RANCH CREEK.

Element occurrence data:

CA. 600-700 PLANTS, IN 10 SUBPOPULATIONS; FLOWER AND EARLY
FRUIT; EVIDENCE OF LIVESTOCK GRAZING, ESPECIALLY ON LOWER
SLOPES.

General site description:

GULLIED SLOPES, BLUFFS, AND ALONG RIDGELINES, IN CLAY SOIL
DERIVED FROM SAND AND SILTSTONE; ARTEMISIA TRIDENTATA/
ATRIPLEX CONFERTIFOLIA/GRASSLAND "BADLANDS".

Land owner/manager:

STATE LAND - UNDESIGNATED

Information source:

SHELLY, J.S. 1986. FIELD SURVEY TO SOUTHEASTERN MONTANA OF
18-22 MAY 1986.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.008

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: BOBCAT CREEK
County: Powder River

USGS quadrangle: BIDDLE

Township-range: 008S052E Section: 25 NE4
Township-range comments: T8S R53E: Sec 30 SW4

Survey date:	1986-05-21	Elevation:	3600
First observation:	1986	Slope/aspect:	
Last observation:	1986-05-21	Size (acres):	34

Location:

CA. 0.5 AIR MILES NE OF BOBCAT CREEK, 2.6 AIR MILES ENE OF
BIDDLE, MT, BADLANDS ALONG THE LITTLE POWDER RIVER.

Element occurrence data:

CA. 80-100 PLANTS, 3 SUBPOPULATIONS, ONLY 2 PLANTS SEEN ON
BLM LAND; LOWER SLOPES AROUND THE SITES ARE HEAVILY GRAZED,
AND THERE IS EVIDENCE OF LIVESTOCK ON HIGHER SLOPES; SEE GMF
FOR BASE MAP.

General site description:

BARREN SLOPES AND RIDGES OF SILT-CLAY SOIL; WITH ARTEMISIA
TRIDENTATA, ATRIPLEX CONFERTIFOLIA, ALLIUM TEXTILE,
PENSTEMON SP., AND ZIGADENUS SP.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SHELLY, J.S. 1986. FIELD SURVEY TO SOUTHEASTERN MONTANA OF
18-22 MAY 1986.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.009

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: WILD BILL CREEK
County: Powder River

USGS quadrangle: WILD BILL CREEK

Township-range: 009S051E Section: 12
Township-range comments: SW4

Survey date: 1986-05-21	Elevation: 3590
First observation: 1986	Slope/aspect:
Last observation: 1986-05-21	Size (acres): 5

Location:

BUTTE CREEK RD., 1.4 MILES WEST OF WILD BILL CREEK, 1.9
MILES WEST OF STATE HWY 59; 0.1-0.25 AIR MILES NORTH OF THE
ROAD.

Element occurrence data:

CA. 200-225 PLANTS, 1 POPULATION; SOME EVIDENCE OF LIGHT
GRAZING.

General site description:

IN SILT-CLAY SOIL ALONG A LOW RIDGELINE; WITH ARTEMISIA
TRIDENTATA, AGROPYRON SPICATUM, POA SECUNDA, MUSINEON
DIVARICATUM, AND ASTRAGALUS SPATULATUS.

Land owner/manager:

BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SHELLY, J.S. 1986. FIELD SURVEY TO SOUTHEASTERN MONTANA OF
18-22 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.010

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: STAG ROCK KNOLLS
County: Powder River

USGS quadrangle: FORT HOWES

Township-range: 006S045E Section: 12 SW4
Township-range comments: Sec 13 NW4

Survey date:	1988-05-14	Elevation:	3450
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-14	Size (acres):	15

Location:

CUSTER NATIONAL FOREST, 1.5 MILES NORTH OF FORT HOWES RANGER
STATION, 0.5 MILE WEST OF OTTER CREEK ROAD, NW OF STAG ROCK.

Element occurrence data:

CA. 1250 PLANTS, IN 4 SUBPOPULATIONS; FLOWERING.

General site description:

ERODING HILLSIDES AND KNOLLS, IN SILTY-CLAY DERIVED SOILS;
OPEN SOIL, BENEATH PINUS PONDEROSA AND JUNIPERUS SCOPULORUM,
WITH ARTEMISIA TRIDENTATA.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL FOR-
EST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.011

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: FORT HOWES RIDGE
County: Powder River

USGS quadrangle: FORT HOWES

Township-range: 006S045E Section: 24
Township-range comments: NE4

Survey date:	1988-05-14	Elevation:	3550
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-14	Size (acres):	4

Location:

CUSTER NATIONAL FOREST, ON HILLS AND CLIFF 0.25 MILES NW OF
FORT HOWES RANGER STATION.

Element occurrence data:

CA. 600 PLANTS, IN 2 SUBPOPULATIONS; MOST IN FLOWER.

General site description:

ERODING HILLSIDE AND ABOVE SILTSTONE CLIFF WITH ARTEMISIA
TRIDENTATA, GUTIERREZIA SAROTHRAE, CRYPTANTHA CELOSIODES,
AND YUCCA GLAUCA.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.012

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: TAYLOR BUTTE RIM
County: Powder River

USGS quadrangle: FORT HOWES

Township-range: 006S046E Section: 30
Township-range comments: E2

Survey date:	1988-05-14	Elevation:	3400
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-14	Size (acres):	35

Location:

CUSTER NATIONAL FOREST, 0.5 MILES EAST OF OTTER CREEK ROAD
ON SOUTH FORK OF TAYLOR CREEK ROAD, CLIFFLINE TO EAST.

Element occurrence data:

CA. 2000 INDIVIDUALS SCATTERED ABOVE AND BELOW CLIFF LINE.

General site description:

ABOVE AND BELOW ERODING CLIFFLINE; SILTY CLAY; OPEN PINUS
PONDEROSA AND JUNIPERUS SCOPULORUM, WITH ARTEMISIA TRIDENTATA
AND HAPLOPAPPUS ARMERIOIDES.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.013

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: STAG ROCK CLIFF TOPS
County: Powder River

USGS quadrangle: FORT HOWES

Township-range: 006S045E Section: 13 NE4
Township-range comments: T6S R46E, Sec 18 SW4

Survey date:	1988-05-19	Elevation:	3340
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-19	Size (acres):	45

Location:

CUSTER NATIONAL FOREST, 1.5 MILES NORTH OF FORT HOWES RANGER STATION, 0.25 MILE WEST OF OTTER CREEK ROAD, SW OF STAG ROCK.

Element occurrence data:

CA. 1750 PLANTS IN 3 SUBPOPULATIONS SCATTERED ALONG CLIFF-LINE; LESS THAN 10 PERCENT IN FLOWER; LARGE MATS.

General site description:

ERODING CLIFF-LINES IN SILTY-CLAY SOILS, BENEATH MODERATE COVER OF PINUS PONDEROSA AND JUNIPERUS SCOPULORUM, WITH CALAMOVILFA LONGIFOLIA AND ANDROPOGON SCOPARIUS.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.014

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: LYON CREEK RIDGE
County: Powder River

USGS quadrangle: FORT HOWES
GOODSPEED BUTTE

Township-range: 005S046E Section: 36 SW4
Township-range comments: Sec 35 SE4: T6S R46E Sec 5 N2

Survey date: 1988-05-16	Elevation: 3400
First observation: 1988	Slope/aspect:
Last observation: 1988-05-19	Size (acres): 40

Location:

CUSTER NATIONAL FOREST, 3.5 MILES NORTH OF FORT
HOWES, 1 MILE EAST OF OTTER CREEK, JUST NORTH OF LYON CREEK
ROAD.

Element occurrence data:

CA. 2,400 PLANTS IN 4 SUBPOPULATIONS; LARGE MATTED POPULA-
TIONS, NOT FLOWERING. LIGHT GRAZING IN SURROUNDING AREAS.

General site description:

ERODING CLIFF-LINES & RIDGES, IN SILTY-CLAY SOILS, BENEATH
PINUS PONDEROSA, JUNIPERUS SCOPULORUM; WITH ANDROPOGON
SCOPARIUS, FESTUCA IDAHOENSIS, AND SENECIO CANUS.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL FOR-
EST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.015

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: KING CREEK WELL
County: Rosebud

USGS quadrangle: GREEN CREEK

Township-range: 004S044E Section: 22
Township-range comments: NW4

Survey date:	1988-05-16	Elevation:	3350
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-16	Size (acres):	2

Location:

CUSTER NATIONAL FOREST, 5 MILES SOUTH OF ASHLAND, 2.5 MILES
SE OF TONGUE RIVER ROAD ON SOUTH SIDE OF KING CREEK ROAD;
WITHIN WALK-IN/RIDE-IN RESTRICTED ZONE.

Element occurrence data:

CA. 2,000 PLANTS, FLOWERING PROLIFICALLY; POLLINATORS
OBSERVED.

General site description:

ERODING HILLSIDE OF SILTY-CLAY SOIL, WITH ARTEMISIA TRIDENTATA,
ATRIPLEX CONFERTIFOLIA, YUCCA GLAUCA, AND COMANDRA UMBELLATA.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.016

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: STAG ROCK RESERVOIR RIDGES
County: Powder River

USGS quadrangle: FORT HOWES

Township-range: 006S045E Section: 12 NE4
Township-range comments: Sec 1 SE4

Survey date:	1988-05-18	Elevation:	3420
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-18	Size (acres):	35

Location:

CUSTER NATIONAL FOREST, 2.5 MILES NORTH OF FORT HOWES RANGER STATION, 0.5 MILE WEST OF OTTER CREEK ROAD, 0.25 MILE NORTH OF STAG ROCK RESERVOIR.

Element occurrence data:

CA. 950 PLANTS IN 3 SUBPOPULATIONS; ABOUT 75 PERCENT OF POPULATION IN FLOWER.

General site description:

ERODING BARREN KNOLLS AND RIDGES IN SILTY-CLAY SOIL, WITH PHLOX HOODII, FESTUCA IDAHOENSIS, HAPLOPAPPUS AMERIOIDES, AND GUTIERREZIA SAROTHRAE.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.017

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: NW BUTTRESS, TAYLOR BUTTE
County: Powder River

USGS quadrangle: FORT HOWES

Township-range: 006S046E Section: 20 SW4
Township-range comments: Sec 19 SE4

Survey date: 1988-05-19	Elevation: 3360
First observation: 1988	Slope/aspect:
Last observation: 1988-05-19	Size (acres): 30

Location:

CA. 0.75 MILE SE OF FORT HOWES RANGER STATION, ALONG CLIFFS.

Element occurrence data:

CA. 3,050 PLANTS SCATTERED ALONG RIM ROCK. LARGE MATS. NOT
FLOWERING.

General site description:

ERODING CLIFF IN SILTY CLAY SOILS; ONE SUBPOPULATION IN THE
MIDDLE OF BURN AREA (1966).

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.018

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: GATE CREEK
County: Rosebud

USGS quadrangle: BIRNEY DAY SCHOOL

Township-range: 004S043E Section: 34 SE4

Township-range comments: Sec 35 SW4

Survey date: 1988-05-20	Elevation: 3140
First observation: 1988	Slope/aspect:
Last observation: 1988-05-20	Size (acres): 1

Location:

0.3 MILES SOUTH OF GATE CREEK ON THE EAST SIDE OF BIRNEY
CREEK ROAD.

Element occurrence data:

CA. 200-250 PLANTS, FLOWERING; EVIDENCE OF LIVESTOCK
GRAZING.

General site description:

ERODING KNOLL; WITH ARTEMISIA TRIDENTATA, ATRIPLEX
CONFERTIFOLIA AND ANDROPOGON SCOPARIUS.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.019

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: O'DELL CREEK BUTTRESS
County: Rosebud

USGS quadrangle: GREEN CREEK

Township-range: 004S044E Section: 30
Township-range comments:

Survey date:	1988-05-20	Elevation:	3360
First observation:	1988	Slope/aspect:	
Last observation:	1988-05-20	Size (acres):	1

Location:

10 MILES SE OF ASHLAND, MT; CLIFFLINE NE OF INTERSECTION WITH
O'DELL CREEK ROAD.

Element occurrence data:

CA. 200 PLANTS SCATTERED ATOP CLIFF AND BELOW; 25% FLOWERING.

General site description:

IN SILTY-CLAY SOILS, WITH ARTEMISIA TRIDENTATA, FESTUCA
IDAHOENSIS, AND GUTIERREZIA SAROTHRÆ.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

SCHASSBERGER, L.A. 1988 FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.020

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: SHEEP WELL ROAD
County: Powder River

USGS quadrangle: COLEMAN DRAW

Township-range: 003S046E Section: 20
Township-range comments: NE4

Survey date: 1985-05-20	Elevation: 3310
First observation: 1988	Slope/aspect:
Last observation: 1988-05-20	Size (acres): 1

Location:

CUSTER NATIONAL FOREST, CA. 10 MILES EAST OF ASHLAND, MT
(HIGHWAY 212), 0.5 MILES SOUTH OF HIGHWAY, JUST WEST OF DIRT
ROAD.

Element occurrence data:

CA. 200-250 PLANTS SCATTERED ALONG A LOW EMBANKMENT; NOT
FLOWERING.

General site description:

LOW ERODING HILLSIDE IN SILTY-CLAY SOILS, WITH CHRYSOTHAMNUS
NAUSEOSUS, ANDROPOGON SCOPARIUS AND GUTIERREZIA SAROTHRÆ.

Land owner/manager:

CUSTER NATIONAL FOREST, ASHLAND RANGER DISTRICT

Information source:

SCHASSBERGER, L.A. 1988. FIELD SURVEY, CUSTER NATIONAL
FOREST, 13-20 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.021

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: SCOLES RANCH ROAD
County: Powder River

USGS quadrangle: BIDDLE
 BELLE CREEK SW

Township-range: 008S053E Section: 32 SW4SW4
Township-range comments: Sec 31 E2: T9S R53E Sec 5 N2

Survey date: 1989-05-14	Elevation: 3700
First observation: 1988	Slope/aspect: 0-3%/NW
Last observation: 1989-05-14	Size (acres): 5

Location:
CA. 3.75 MILES EAST OF BIDDLE, CA. 1.5 MILES NORTH OF RANCH CREEK.

Element occurrence data:
LOCALLY COMMON. MANY PLANTS DEAD IN 1989 (PROBABLY DUE TO DROUGHT).

General site description:
ON SILTY-CLAY "GUMBO" KNOLLS AND SLOPES, WITH GUTIERREZIA SAROTHRAE, ARTEMISIA FRIGIDA, AND CHRYSOTHAMNUS NAUSEOSUS.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:
SCHASSBERGER, L.A. 1989. FIELD SURVEYS OF SOUTHEAST MONTANA, 11-17 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.022

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: SOUTH FORK WRIGHT CREEK 1
County: Powder River

USGS quadrangle: BELLE CREEK SW

Township-range: 009S053E Section: 02
Township-range comments: S2

Survey date:	1989-05-15	Elevation:	3760
First observation:	1989	Slope/aspect:	0-8%/ENE
Last observation:	1989-05-15	Size (acres):	2

Location:

CA. 6 MILES EAST OF BIDDLE, MT (UP THE BIDDLE TO RIDGE ROAD) AND
CA. 2.1 MILES NORTH OF
RANCH CREEK.

Element occurrence data:
LOCALLY COMMON.

General site description:

SILTY-CLAY "GUMBO" KNOLLS AND KNOBS, WITH ARTEMISIA FRIGIDA,
ASTRAGALUS SPATULATUS, AND A. GILVIFLORUS.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

SCHASSBERGER, L.A. 1989. FIELD SURVEYS OF SOUTHEAST MONTANA,
11-17 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.023

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: SOUTH FORK WRIGHT CREEK 2
County: Powder River

USGS quadrangle: BELLE CREEK SW

Township-range: 009S053E Section: 12
Township-range comments: NE4

Survey date: 1989-05-15	Elevation: 4000
First observation: 1988	Slope/aspect: 0-8%/ENE
Last observation: 1989-05-15	Size (acres): 2

Location:

CA. 7 MILES EAST OF BIDDLE, MT (ALONG THE BIDDLE TO RIDGE ROAD,
CA. 1.5 MILES NORTH OF RANCH
CREEK.

Element occurrence data:

LOCALLY COMMON. MANY PLANTS DEAD IN 1989 (PROBABLY DUE TO
DROUGHT).

General site description:

ON SILTY-CLAY "GUMBO" KNOLLS AND SLOPES, WITH ARTEMISIA
FRIGIDA, ASTRAGALUS SPATULATUS, AND A. GILVIFLORUS.

Land owner/manager:

BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SCHASSBERGER, L.A. 1989. FIELD SURVEYS OF SOUTHEAST MONTANA,
11-17 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.024

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: RANCH CREEK 1
County: Powder River

USGS quadrangle: BIDDLE

Township-range: 009S052E Section: 12 E2
Township-range comments: Sec 13 NE4: T9S R53E Sec 7 SW4NW4, Sec 18
NW4SW4

Survey date:	1989-05-15	Elevation:	3600
First observation:	1989	Slope/aspect:	0-8%/NE,NW,SW
Last observation:	1989-05-15	Size (acres):	40

Location:

CA. 3 MILES SOUTHEAST OF BIDDLE, MT (SOUTH OF THE BIDDLE TO RIDGE ROAD).

Element occurrence data:

LOCALLY COMMON. MANY DEAD PLANTS OBSERVED IN 1989 (PROBABLY DUE TO DROUGHT)

General site description:

ON SILTY-CLAY "GUMBO" KNOLLS AND SLOPES WITH PHLOX HOODII, LOMATIUM COUS, AND ARTEMISIA TRIDENTATA.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SCHASSBERGER, L.A. 1989. FIELD SURVEYS OF SOUTHEAST MONTANA, 11-17 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.025

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: SOUTH BIDDLE
County: Powder River

USGS quadrangle: BIDDLE

Township-range: 009S052E Section: 4 NW4
Township-range comments: T8S R52E Sec 33 SE4

Survey date: 1989-05-16	Elevation: 3500
First observation: 1989	Slope/aspect: 0-8%/WEST
Last observation: 1989-05-16	Size (acres): 5

Location:

CA. 1.5 MILES SOUTHWEST OF BIDDLE, EAST AND WEST OF HIGHWAY
59.

Element occurrence data:

LOCALLY COMMON, MANY PLANTS DEAD IN 1989. (PROBABLY DUE TO
DROUGHT.)

General site description:

SILTY-CLAY "GUMBO" KNOLLS AND KNOBS, WITH PHLOX HOODII,
ARTEMISIA TRIDENTATA, AND CHRYSOTHAMNUS NAUSEOSUS.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

SCHASSBERGER, L.A. 1989. FIELD SURVEYS OF SOUTHEAST MONTANA,
11-17 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.026

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: BELL CREEK
County: Powder River

USGS quadrangle: PINE CREEK

Township-range: 007S053E Section: 30
Township-range comments: W2

Survey date: 1989-08-18	Elevation: 3580
First observation: 1989	Slope/aspect: 0-35% / NW
Last observation: 1989-08-18	Size (acres): 5

Location:

CA. 6.5 MILES NNE OF BIDDLE, MT; CA. 2.5 MILES EAST OF HIGHWAY
59, AND CA. 1.2 MILES NORTH OF THE BELLE CREEK ROAD.

Element occurrence data:

SMALL POPULATION, MANY PLANTS DEAD IN 1989 (PROBABLY DUE TO
DROUGHT).

General site description:

SILTY-CLAY KNOBS AND KNOLLS, WITH CHRYSOTHAMNUS NAUSEOSUS,
ARTEMISIA TRIDENTATA, AND ASTRAGALUS SPATULATUS. AREA IS
HEAVILY GRAZED.

Land owner/manager:

BLM: POWDER RIVER RESOURCE AREA, MILES CITY DISTRICT

Information source:

SCHASSBERGER, L.A. 1989. FIELD SURVEYS OF SOUTHEAST MONTANA,
11-17 MAY.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.027

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: COLSTRIP SOUTHEAST
County: Rosebud

USGS quadrangle: COLSTRIP SE

Township-range: 001N041E Section: 12
Township-range comments: NW4SW4

Survey date:	Elevation: 3359
First observation: 1976	Slope/aspect: 10% / EAST
Last observation: 1976-05-28	Size (acres): 0

Location:

CA. 5.5 KM. SOUTHEAST OF COLSTRIP, MT; ABOVE BORROW PIT, ALONG
WEST SIDE HWY. 39.

Element occurrence data:
NONE.

General site description:

ON SANDSTONE HILLSLOPE (ENTISOL), WITH PINUS PONDEROSA,
ANDROPOGON SCOPARIUS, ORYZOPSIS HYMENOIDES AND BROMUS
TECTORUM.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

PLANTENBERG, PATRICK L. DEPT OF STATE LANDS, HARD ROCK
BUREAU, RECLAMATION DIVISION, 1625 11TH AVE., HELENA, MT
59620.

ASTRAGALUS BARRII
BARR'S MILK-VETCH

Element occurrence code: PDFAB0F150.028

Global rank: G3 Forest Service status: SENSITIVE LIST
State rank: S3

Survey site name: SPRING CREEK
County: Big Horn

USGS quadrangle: PEARL SCHOOL

Township-range: 008S039E Section: 23
Township-range comments: NW4SE4

Survey date:	Elevation: 3950
First observation: 1989	Slope/aspect: 15% / SW
Last observation: 1989-06-21	Size (acres): 1

Location:

CA. 8 MILES NNW OF DECKER, MT; SPRING CREEK DRAINAGE (SPRING CREEK MINE), CA. 2 MILES SOUTHWEST OF HWY. 314.

Element occurrence data:

CA. 12 PLANTS, RANGING IN SIZE FROM 1-25 CM. IN DIAMETER, MOST OLDER PLANTS BEARING FRUIT (1989).

General site description:

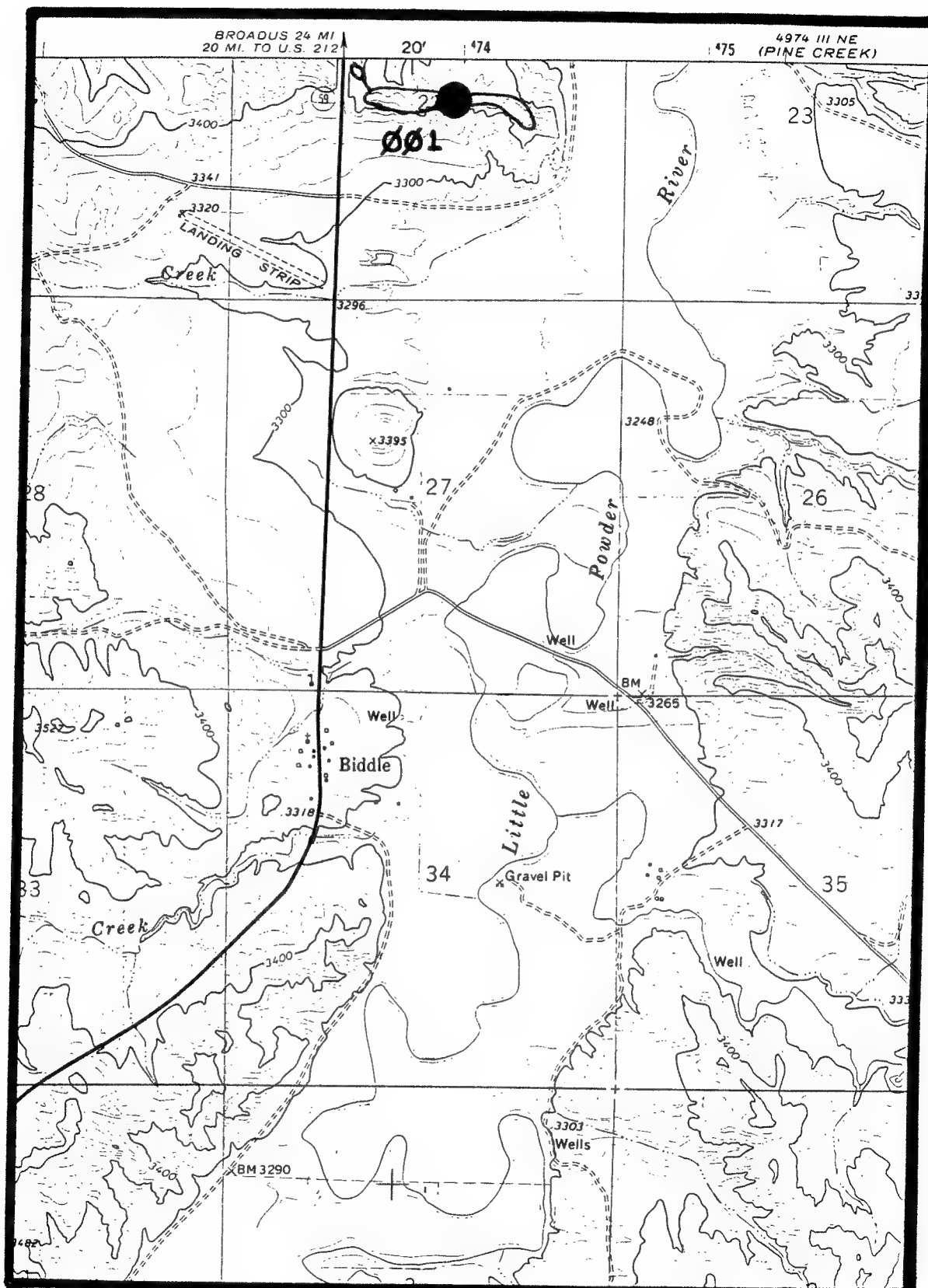
SOUTHWEST-FACING, 15 PERCENT SLOPE; ON FINE, SANDY CLAY LOAM SOIL, ABOVE A SANDSTONE OUTCROP, WITH ARTEMISIA TRIDENTATA, AGROPYRON SPICATUM, AND PHLOX HOODII.

Land owner/manager:

PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Information source:

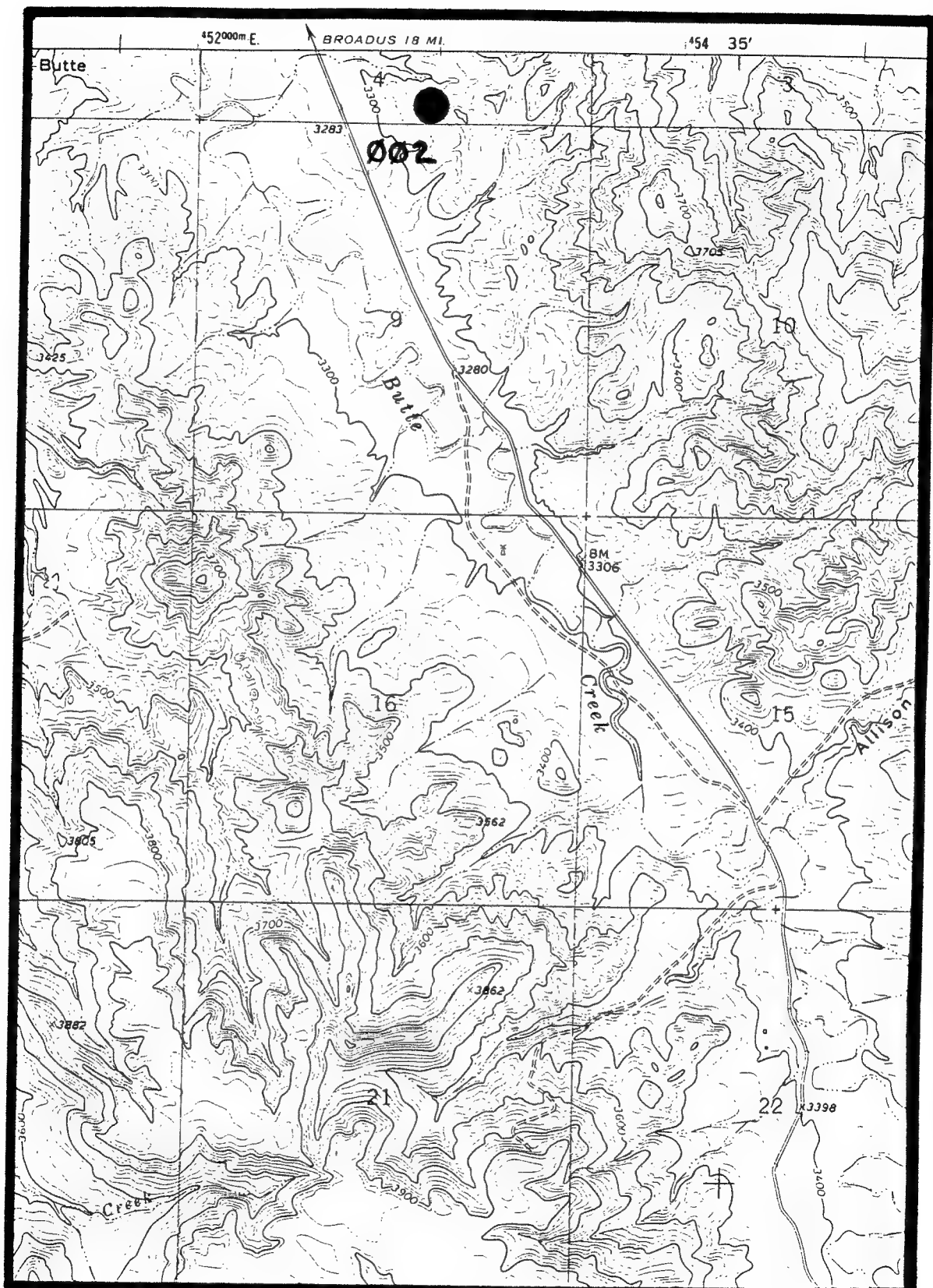
HALLSTEN, G.P. DEPARTMENT OF STATE LANDS, RECLAMATION - COAL AND URANIUM BUREAU, 1625 11TH AVE., HELENA, MT 59620.



USGS Biddle Quadrangle (7.5')

Biddle (001)

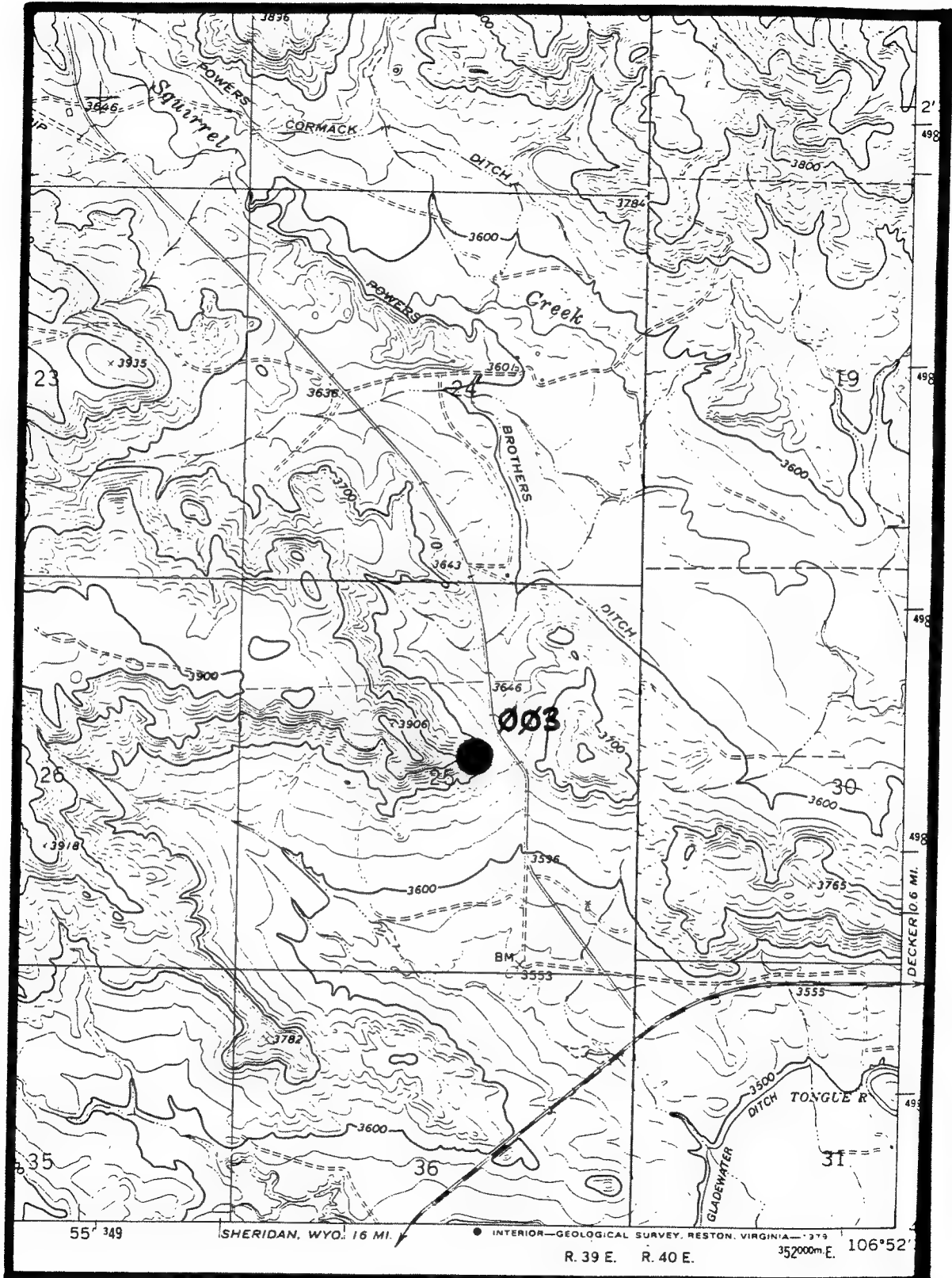
Astragalus barrii



USGS Baldy Peak Quadrangle (7.5')

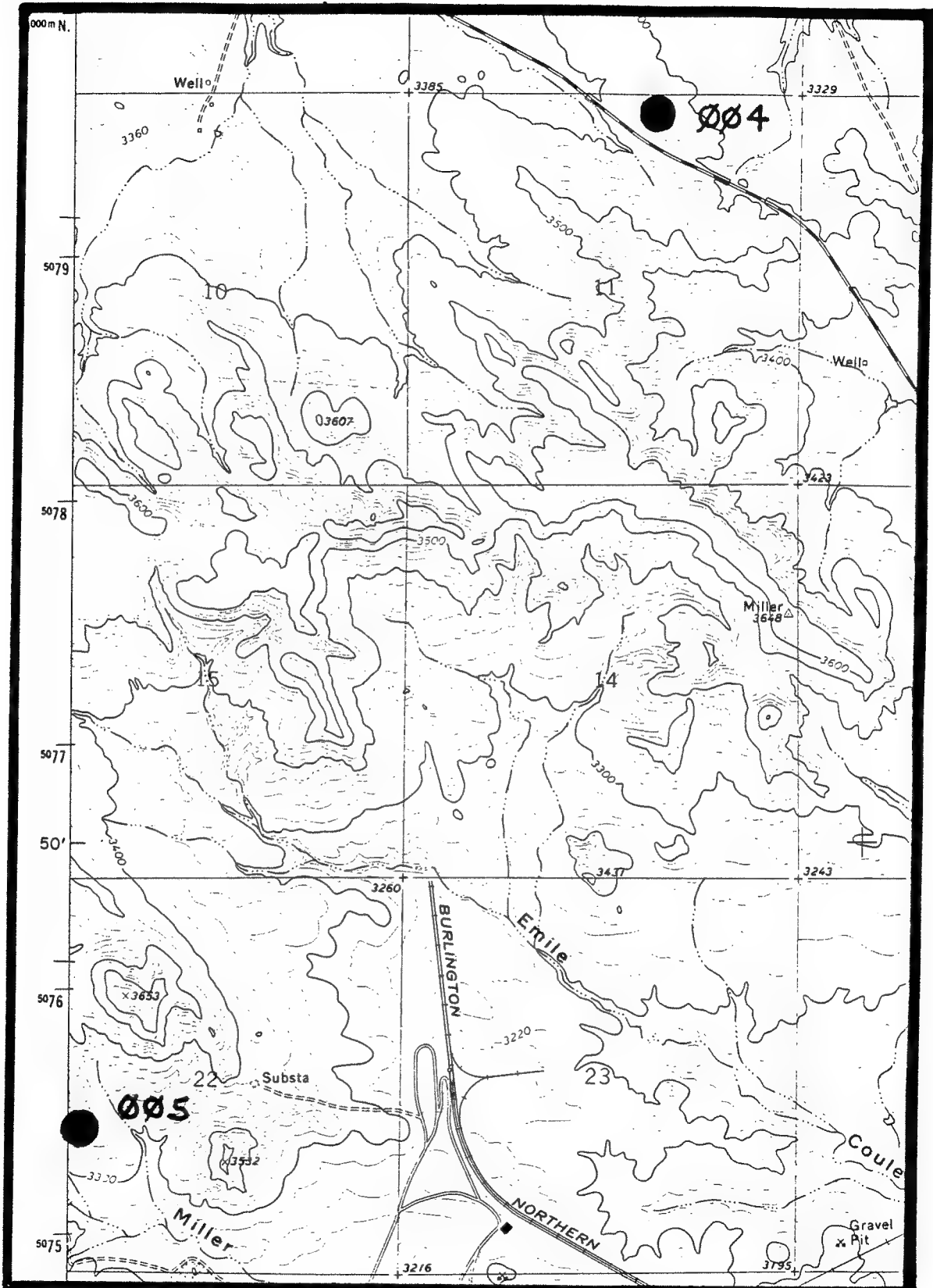
Butte Creek (002)

Astragalus barrii

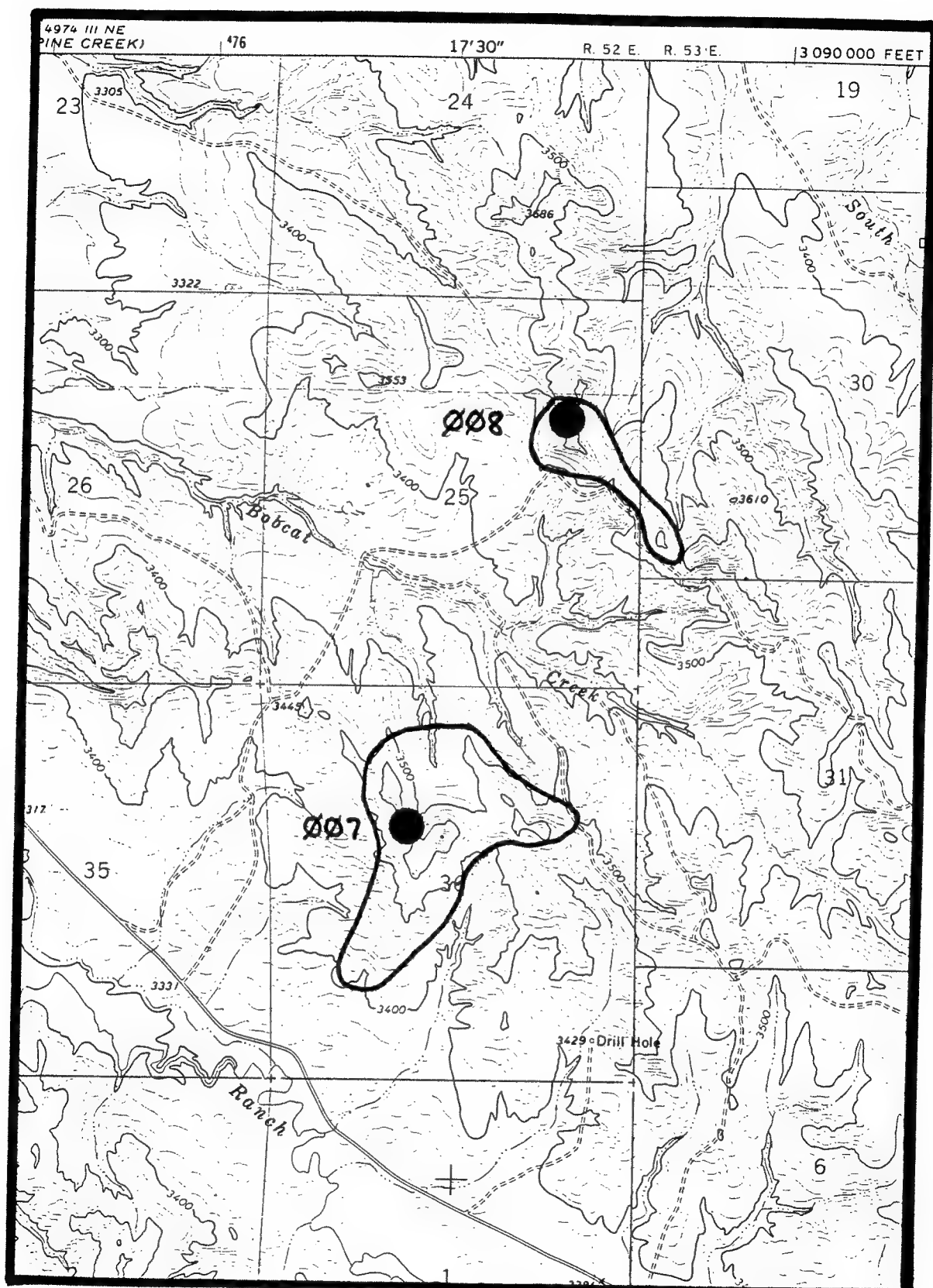


USGS Pearl School Quadrangle (7.5')
Astragalus barrii

Decker (003)

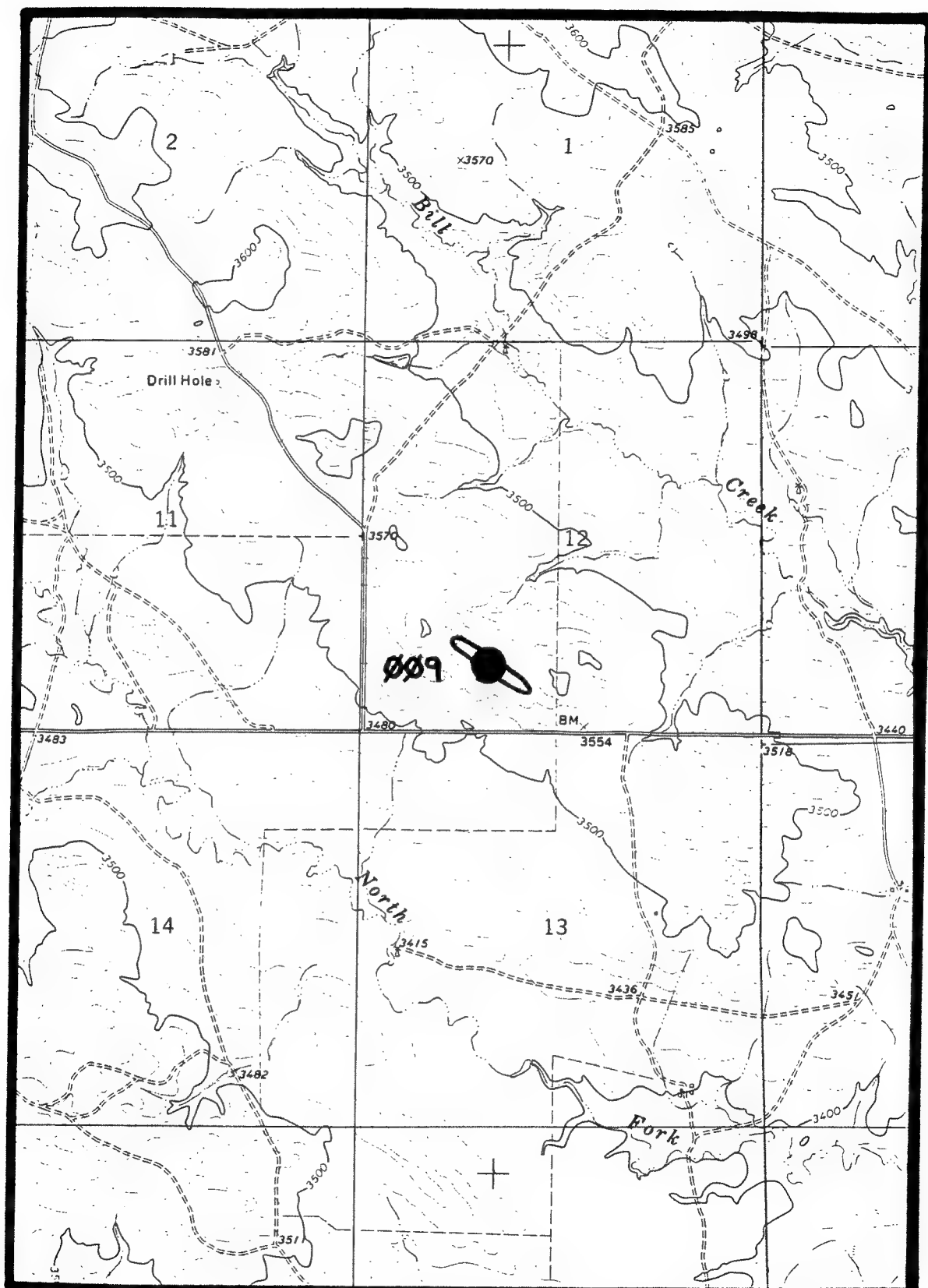


USGS Colstrip SE Quadrangle (7.5')
Astragalus barrii



USGS Biddle Quadrangle (7.5')
Astragalus barrii

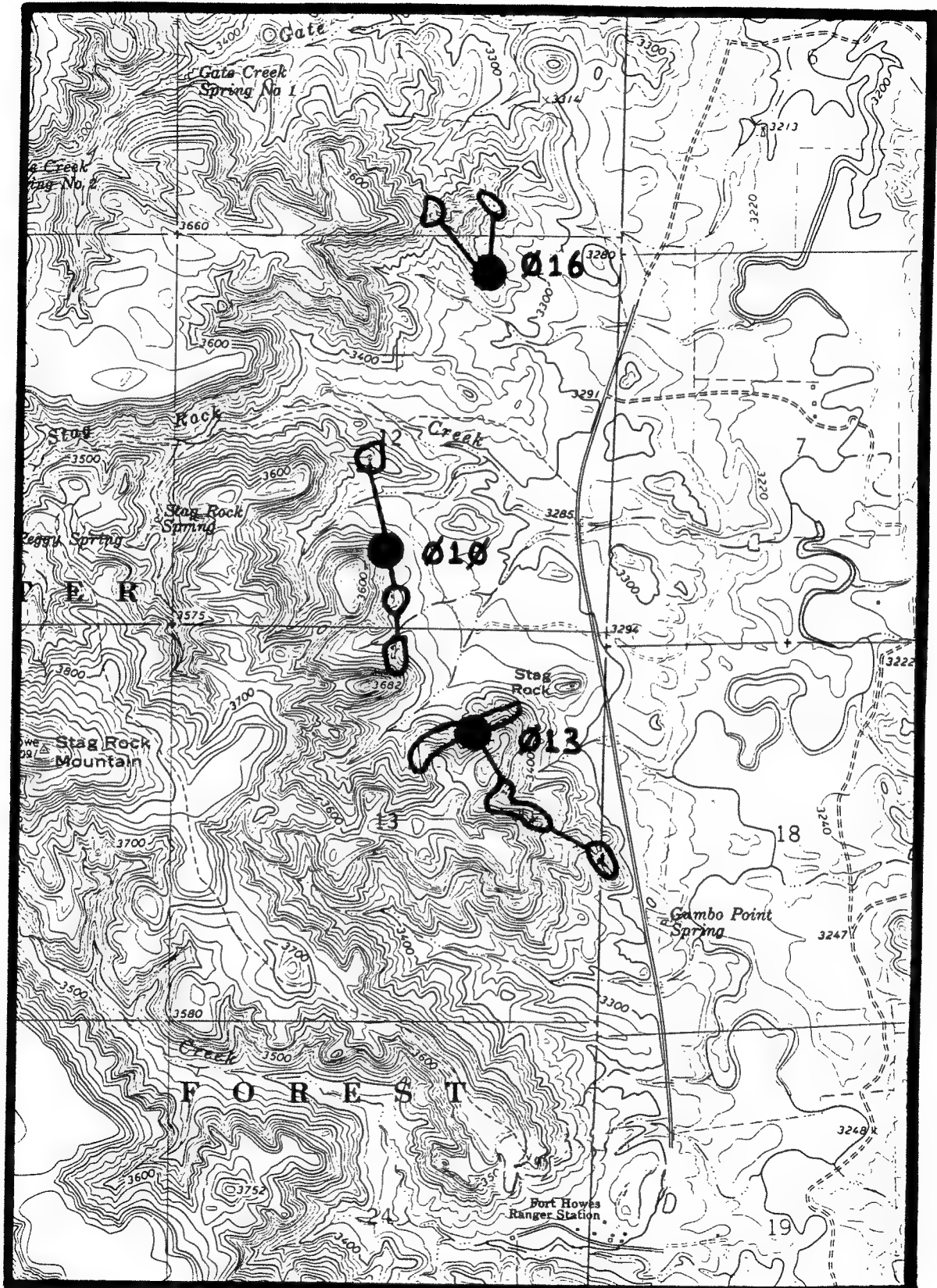
Biddle School Section (007)
Bobcat Creek (008)



USGS Wild Bill Creek Quadrangle (7.5')

Wild Bill Creek (009)

Astragalus barrii



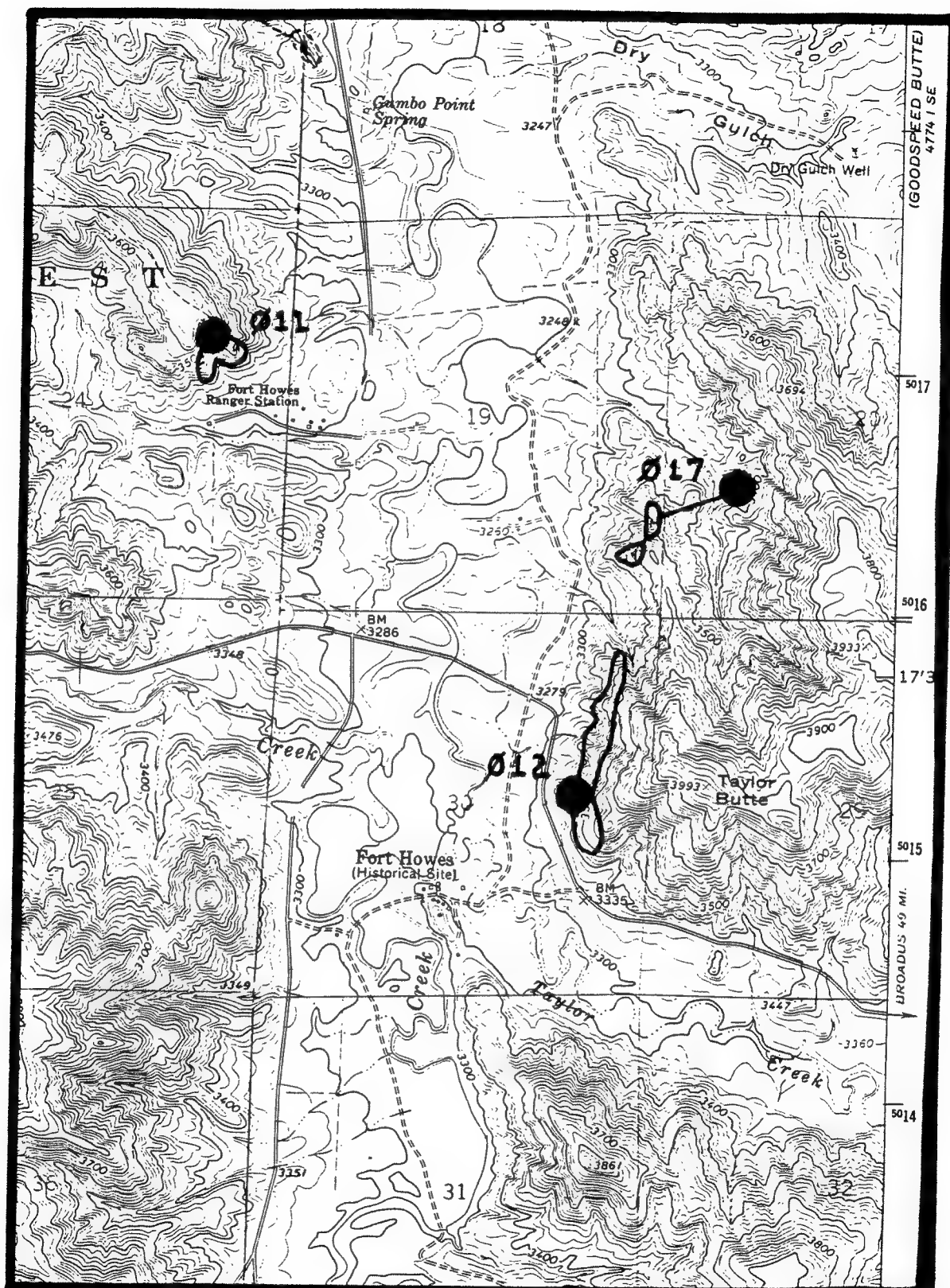
USGS Fort Howes Quadrangle (7.5')

Astragalus barrii

Stag Rock Knolls (010)

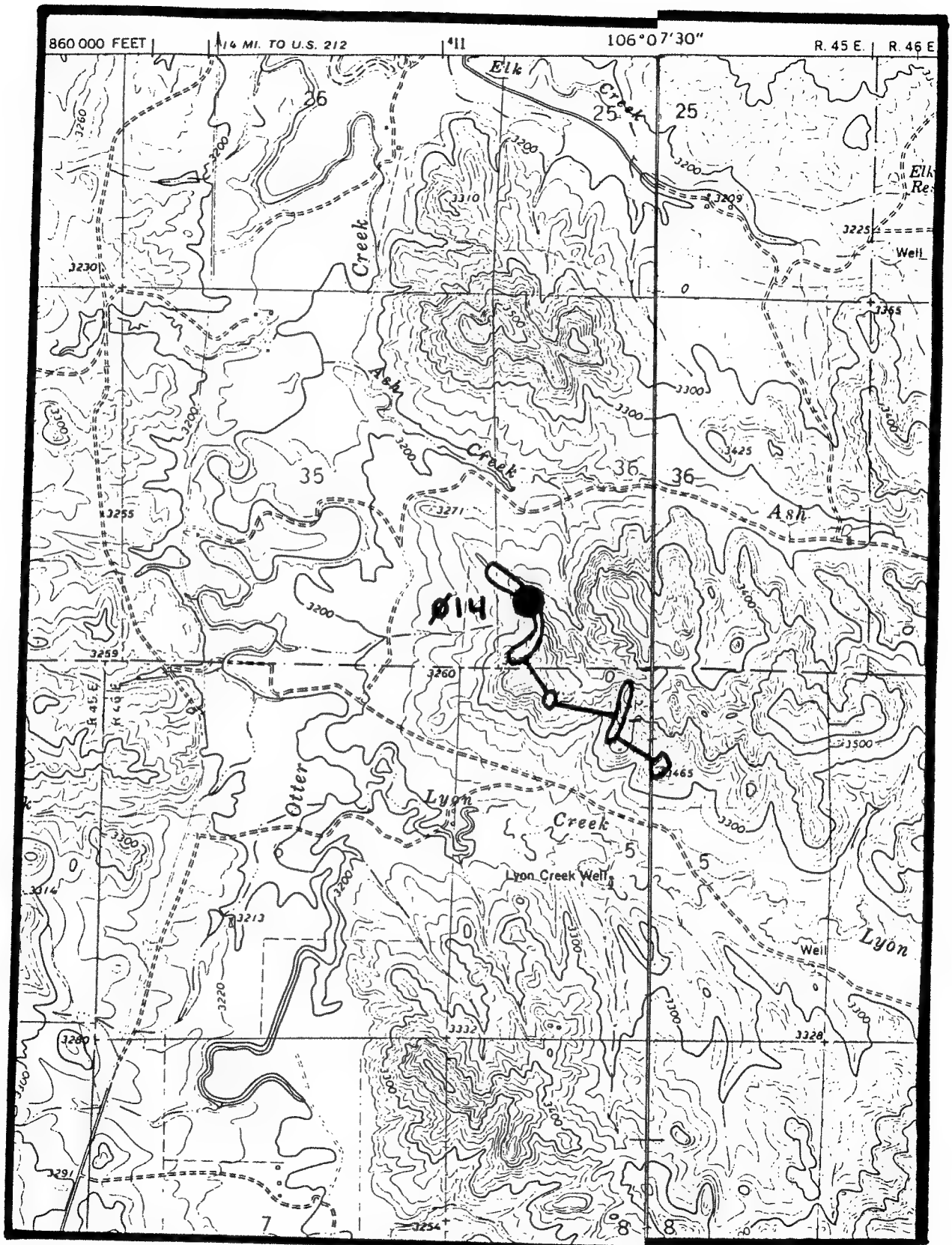
Stag Rock Cliff Tops (013)

Stag Rock Reservoir Ridges (016)



USGS Fort Howes Quadrangle (7.5')
Astragalus barrii

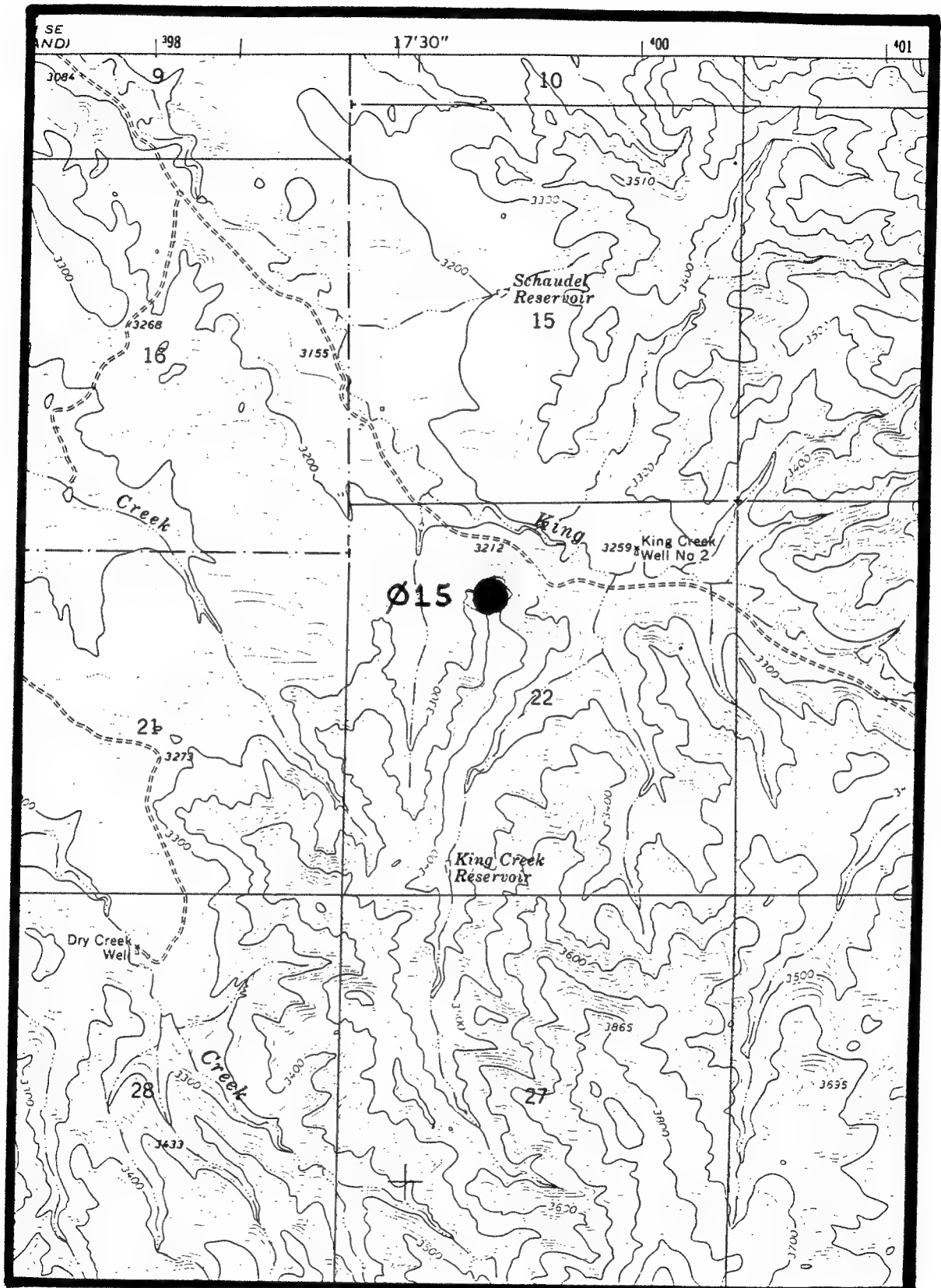
Fort Howes Ridge (011)
 Taylor Butte Rim (012)
 NW Buttress Taylor Butte (017)



USGS Quadrangles: Fort Howes (left);
Goodspeed Butte (right)

Lyon Creek Ridge (Ø14)

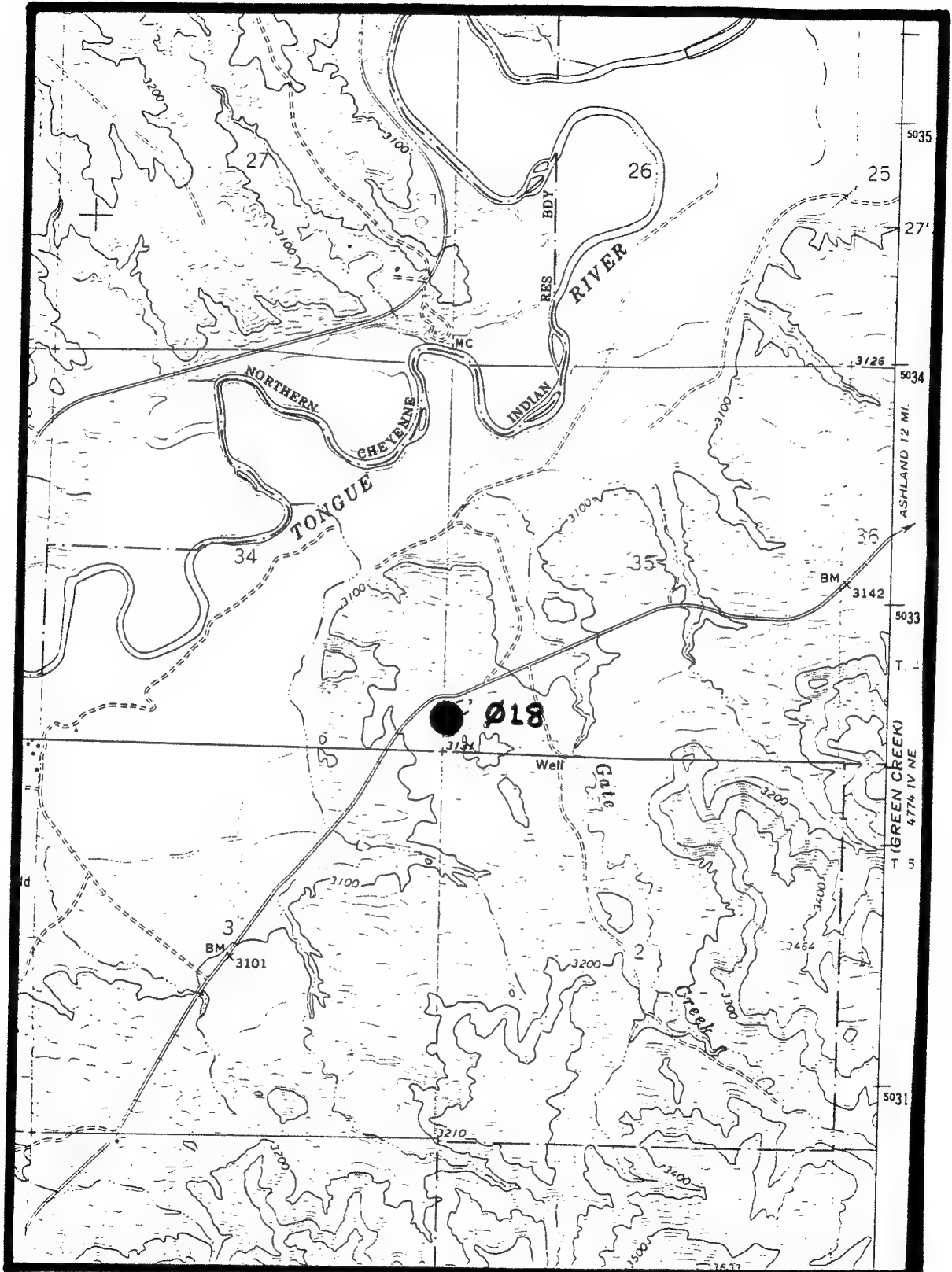
Astragalus barrii



USGS Green Creek Quadrangle (7.5')

King Creek Well (015)

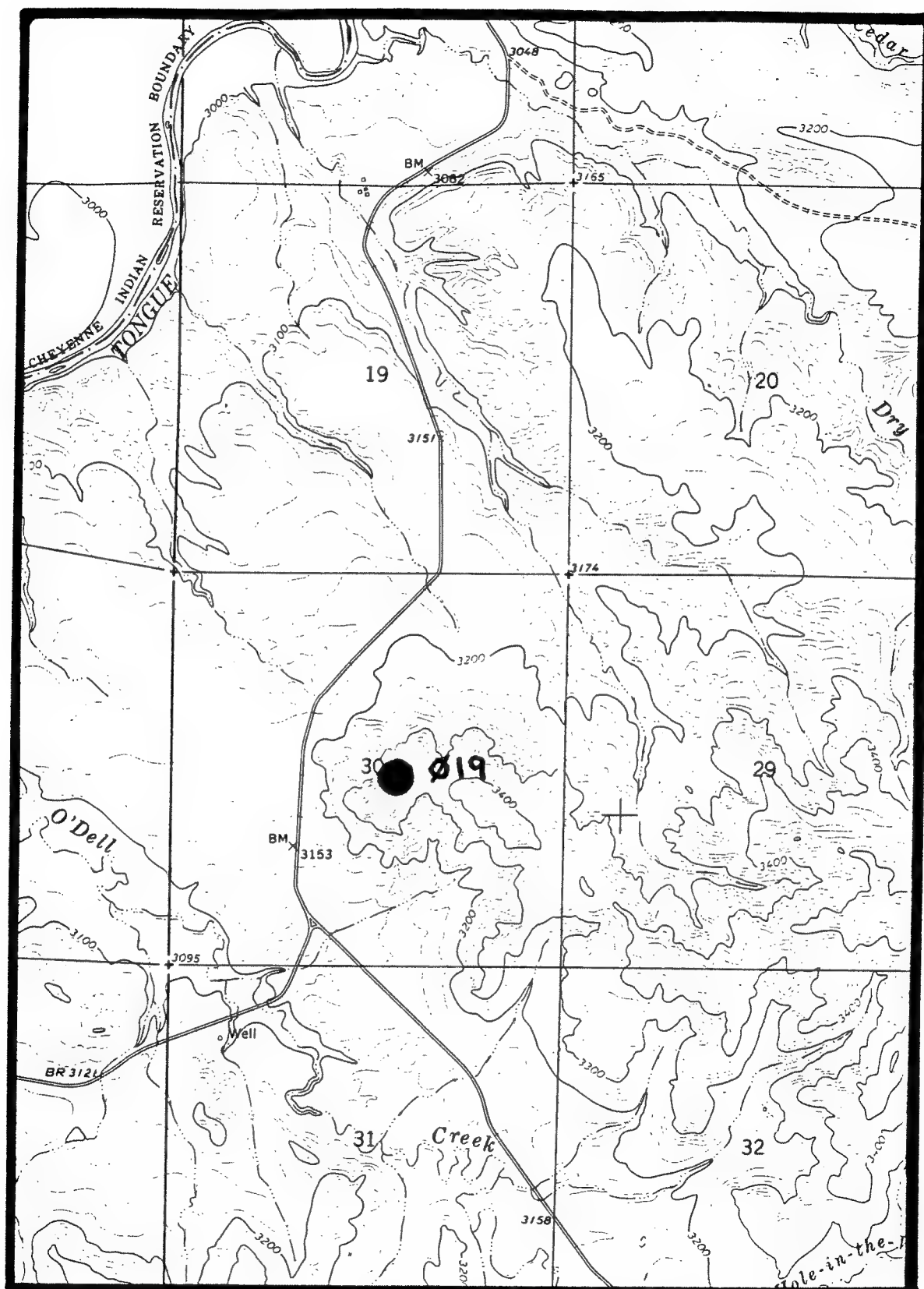
Astragalus barrii



USGS Birney Day School Quadrangle (7.5')

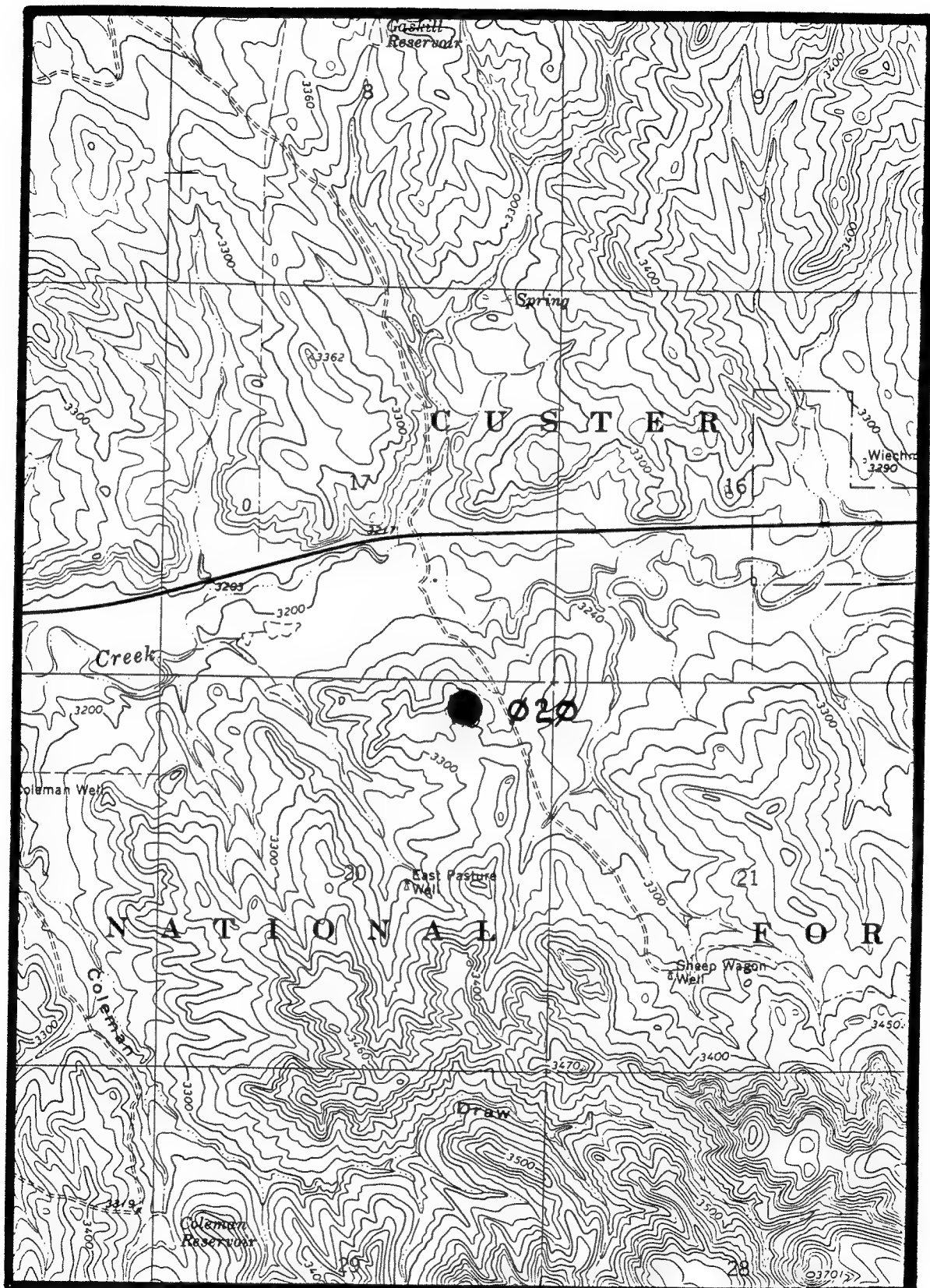
Gate Creek (018)

Astragalus barrii



USGS Green Creek Quadrangle (7.5')
Astragalus barrii

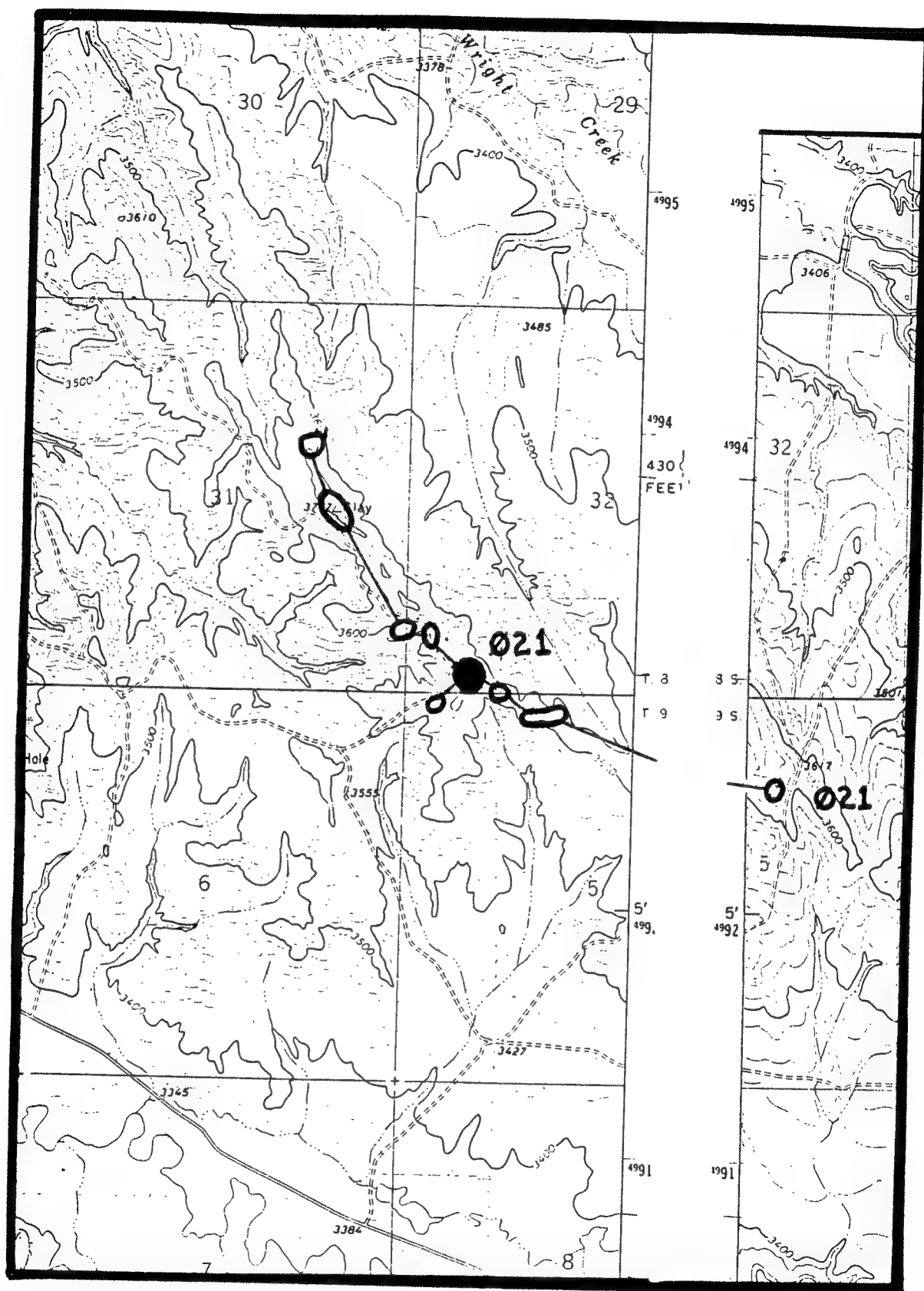
O'Dell Creek Butress (019)



USGS Coleman Draw Quadrangle (7.5')

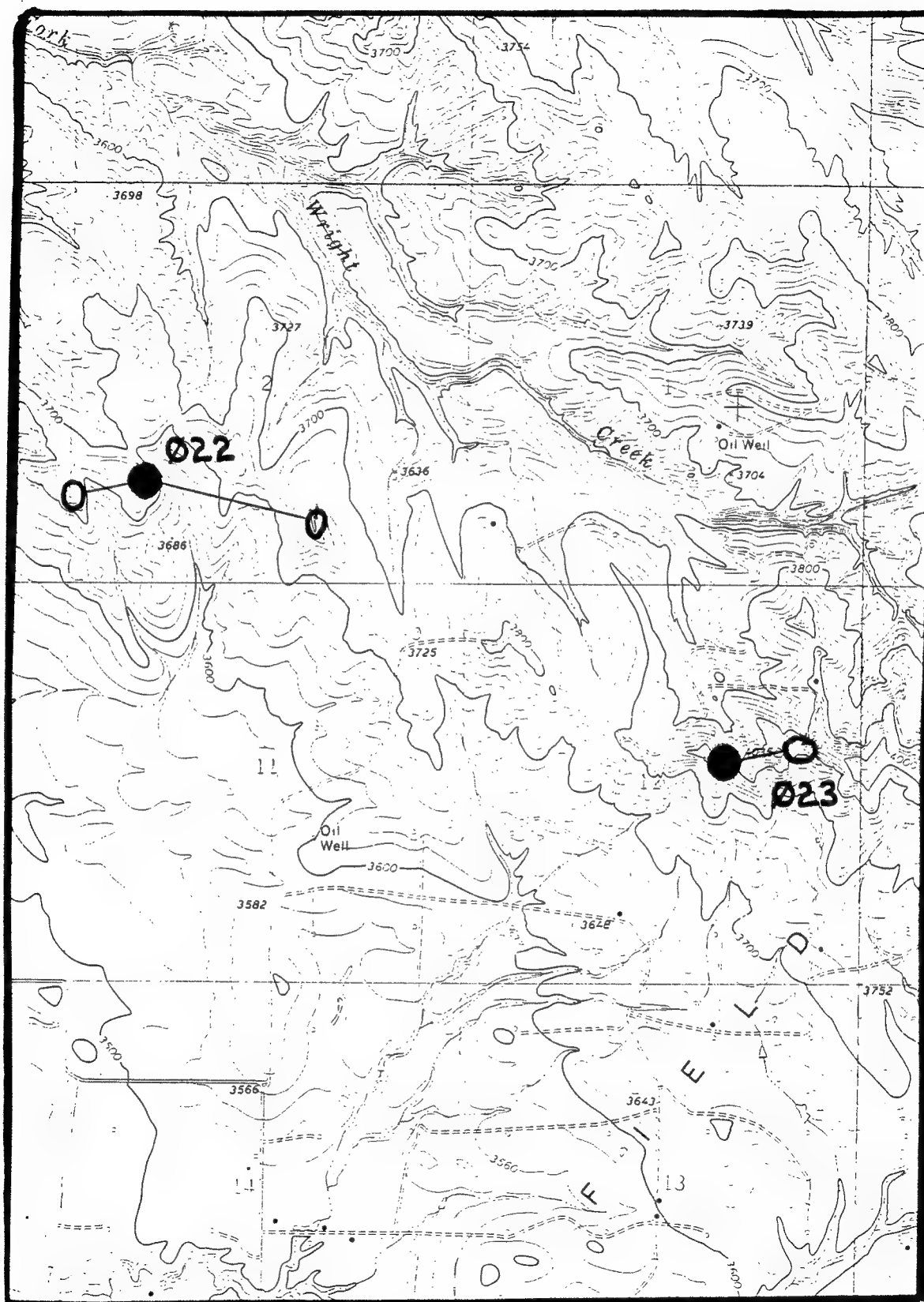
Sheep Well Road (020)

Astragalus barrii



Scoles Ranch Road (021)

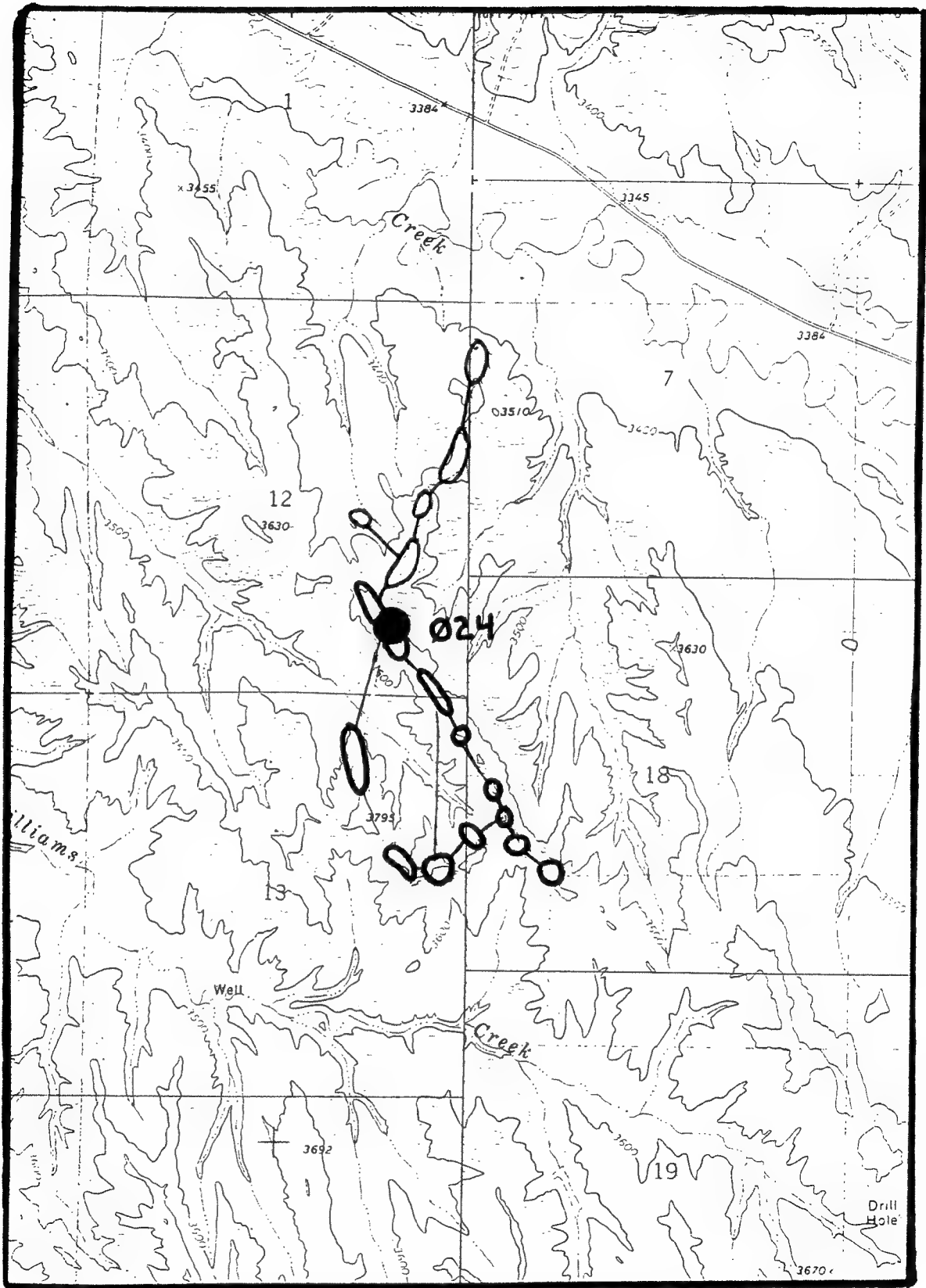
Astragalus barrii



USGS Belle Creek SW (7.5')

South Fork Wright Creek 1 (022)
South Fork Wright Creek 2 (023)

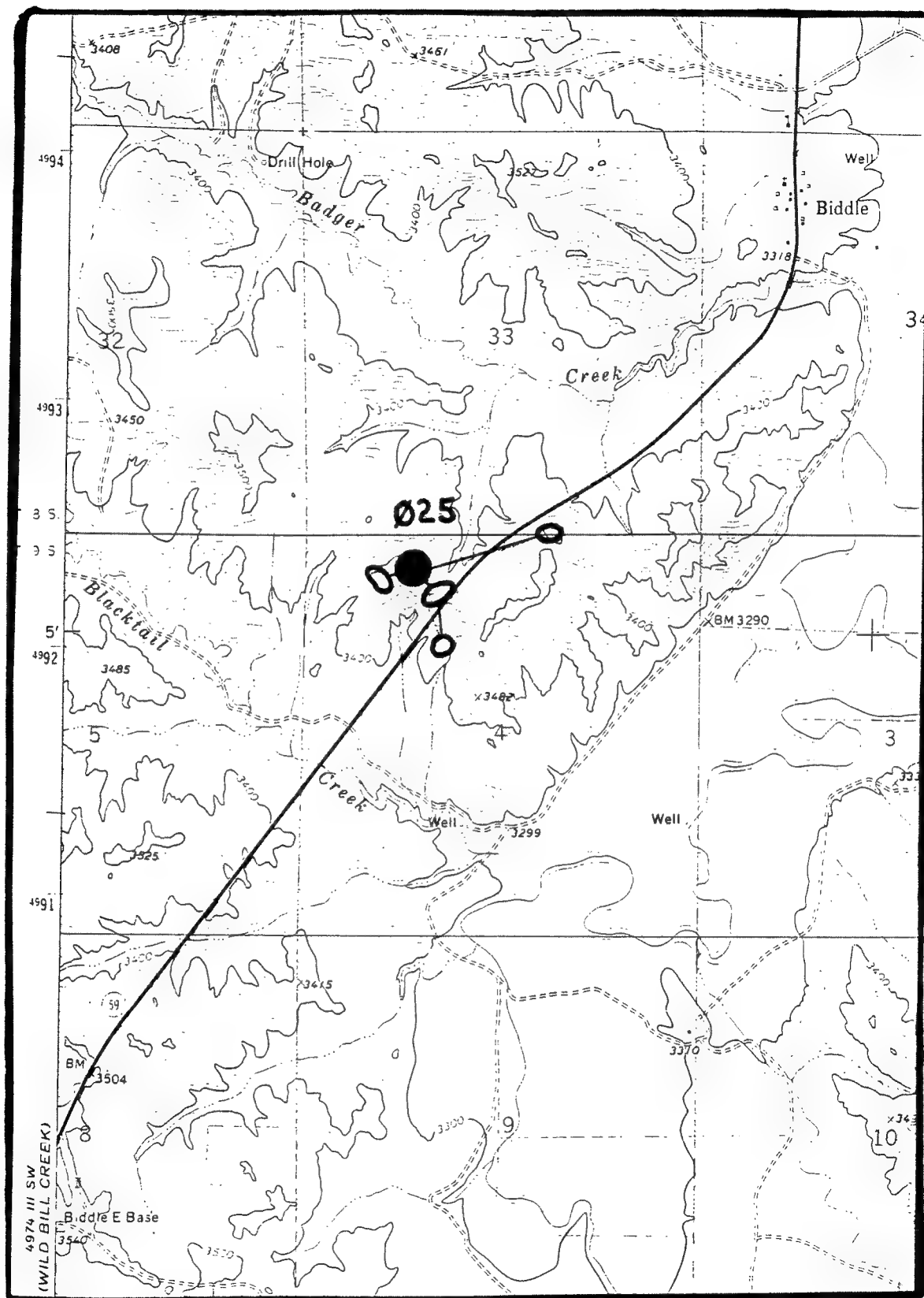
Astragalus barrii



USGS Biddle (7.5')

Ranch Creek 1 (024)

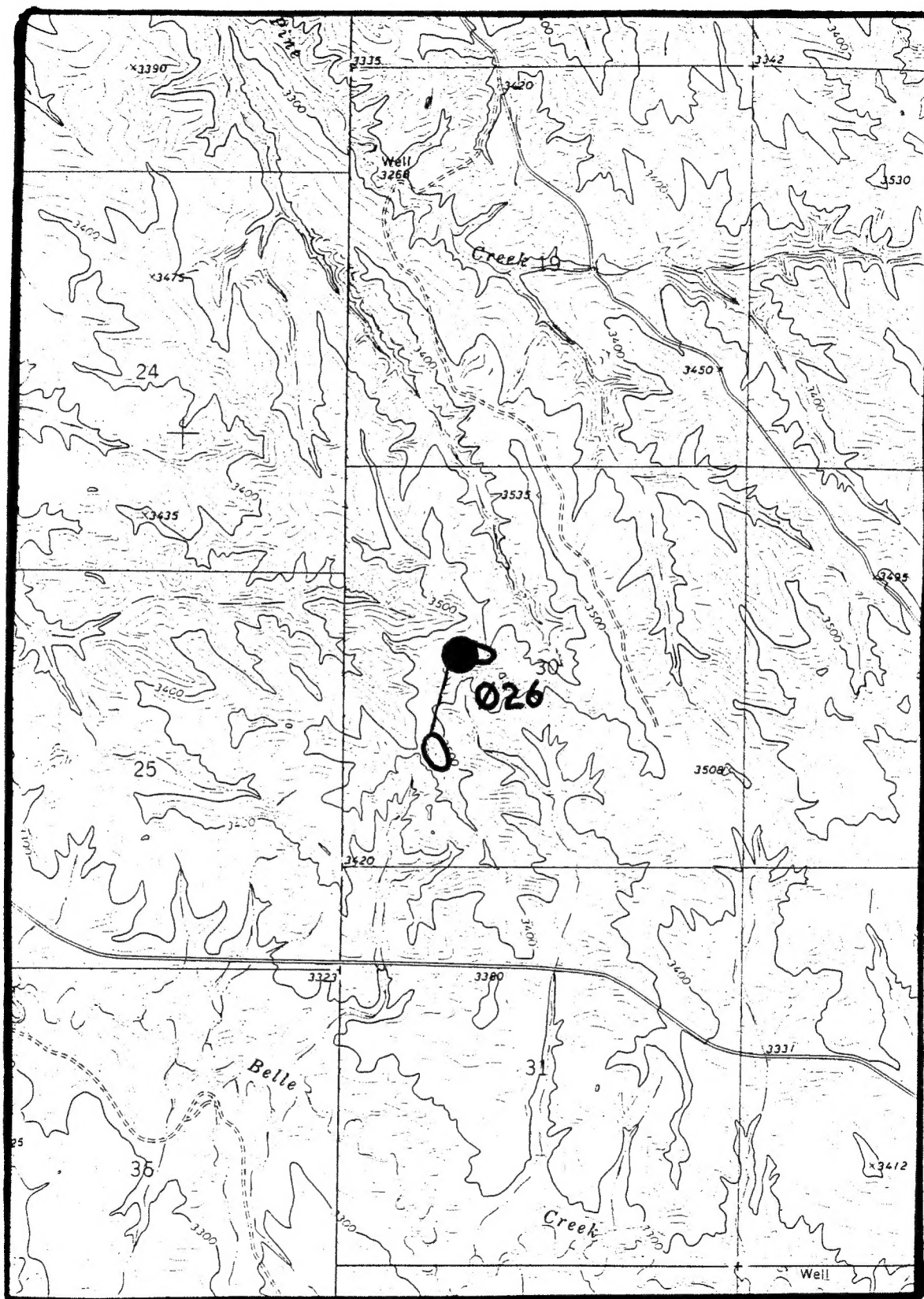
Astragalus barrii



USGS Biddle (7.5')

South Biddle (025)

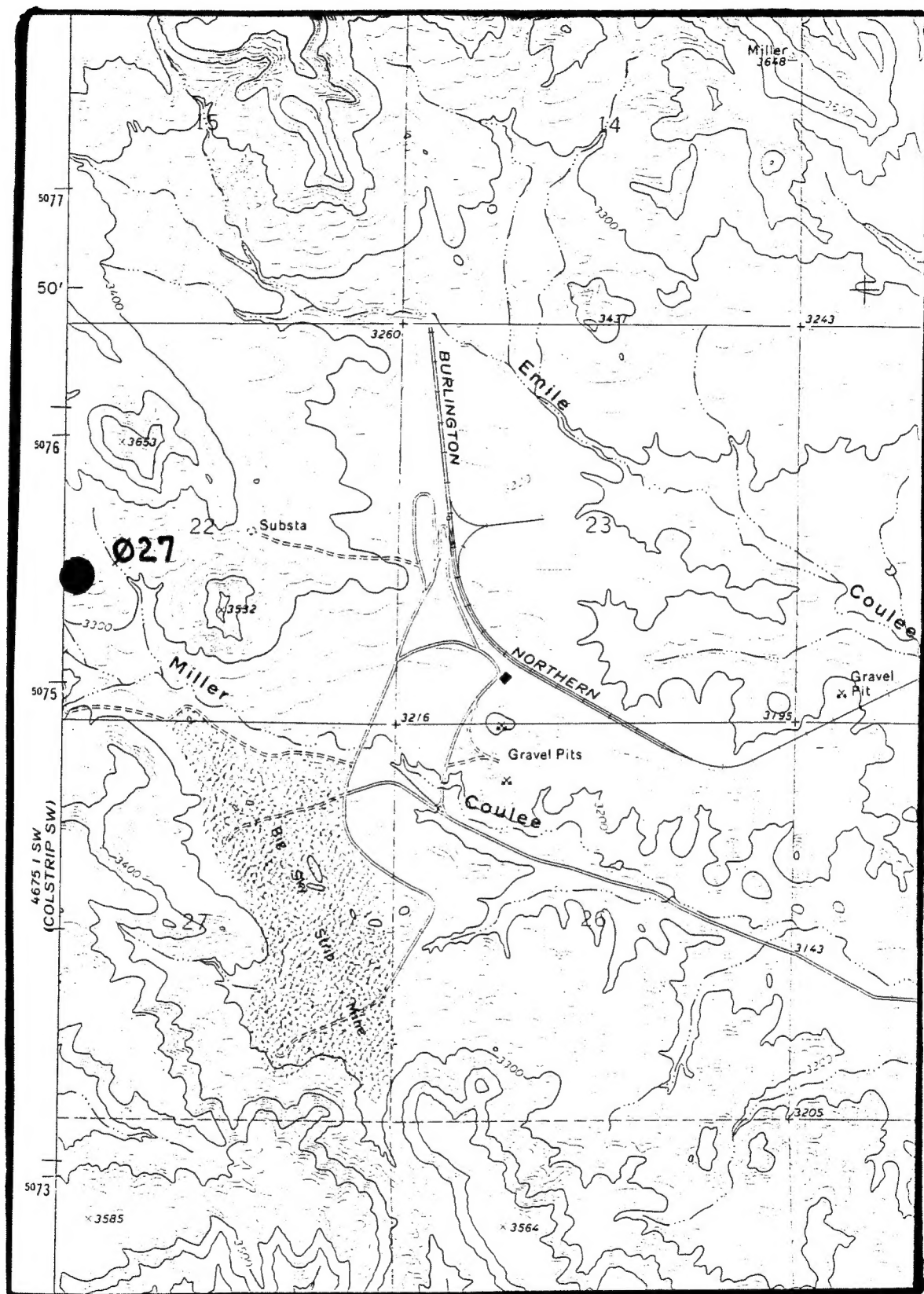
Astragalus barrii



USGS Pine Creek (7.5')

Bell Creek (026)

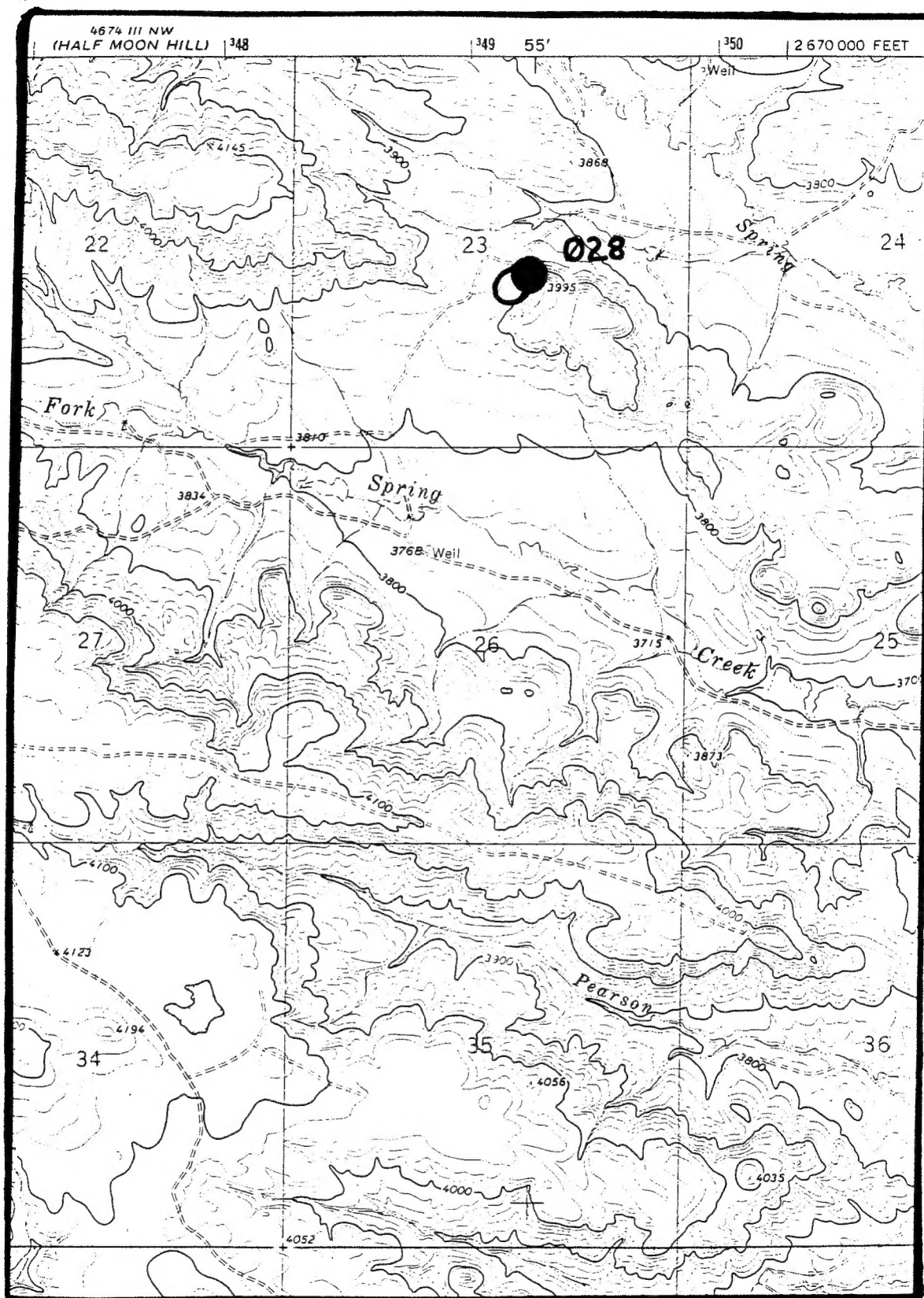
Astragalus barrii



USGS Colstrip SE (7.5')

Colstrip Southeast (027)

Astragalus barrii



USGS Pearl School (7.5')

Spring Creek (028)

Astragalus barrii

